THE

AMERICAN NATURALIST.

Vol. II.—JUNE, 1868.—No. 4.

THE WARBLERS.

BY T. MARTIN TRIPPE.

Of all the various tribes of the feathered race that pour into the Northern and Middle States every spring, there is not one that will compare in beauty of plumage, and exquisiteness of form, with the family of the Warblers (*Sylvicolidæ*). Combining all that we admire in birds, and visiting us only in the most delightful season of the year, it is no wonder that they have been so much praised and admired. And yet they are very imperfectly known; even the specific rank of some of them seems scarcely to be established; while the breeding habits of many are as little known now, as they were in the days of Audubon and Wilson. Of late years, however, much has been accomplished in this direction; and, before long, we may hope to become as well acquainted with all of them, even the rarest, as we now are with the common yellow warbler.

Although some of the warblers are undoubtedly very rare, their general scarcity has been much exaggerated. That this should have been so, fifty years ago, is not surprising, when we consider the extremely short period during which most of them are found with us, sometimes not exceeding two or three days. In some instances, I have known a particular

Entered according to Act of Congress, in the year 1868, by the Peabody Academy of Science, in the Clerk's Office of the District Court of the District of Massachusetts.

species to be extremely abundant during a single forenoon, while scarcely a single individual was to be seen during the rest of the spring, so quickly do they come and go. But that this should still be the case; that errors, which were made, perhaps unavoidably, by Audubon and Wilson, should still be perpetuated, is a matter of surprise and regret. Some species are much more abundant now than they were in the days of the older ornithologists, and some probably scarcer. Thus, both Audubon and Wilson mention the chestnut-sided warbler as one of the rarest of all, whereas it is now very abundant. Another general error was, in stating that they all withdrew to the far north to breed. There are, probably, very few of the species that enter the New England States that will not be found to raise their young in some part of its territory, large portions of which have not as yet been scientifically explored. Little attention, likewise, seems to have been paid to their notes and songs; and many, even, who are entitled to be ranked among the highest of our songsters, have been considered as destitute of musical ability altogether. The warblers have always been favorites of mine, and I have paid much attention to their habits and notes, particularly the latter. In the following brief sketch it is my intention to give a short account of each of the members of this interesting family, and to notice, more especially, such particulars as are not generally known, in regard to their songs, as have fallen under my observations.

The Pine-creeping Warbler (*Dendroica pinus*) is the first of the family to visit us in the spring, and arrives, in my locality in the latitude of New York, about the first of April. I have never known it to be very abundant, though it is seldom scarce. It affects, principally, the evergreen woods, but is often met with in other places. Its song, or rather note, for it can scarcely be said to have a song, is a rapid chatter, quite different from that of any other warbler, though it bears some resemblance to that of the *Myiodioctes pusillus*.

Soon after the pine-warbler has arrived, generally not more than four or five days, the Yellow Red-polled Warbler (*D. palmarum*) makes his appearance. Not very familiar, and yet not shy, they betake themselves to the deciduous woods, where, in numerous companies or small parties, they spend a couple of weeks, and then pursue their journey north. I have never heard them utter any other notes than a sharp "chuck," and a low chirp, which seems to be common to all the family, and can scarcely be distinguished in the different species. Unlike the other members of the particular subdivision of the family to which they belong, the Wood-warblers (*Sylvicoleæ*), they often descend to the ground, where they run about with as much agility as the Maryland yellow-throat. Another peculiarity which characterizes them is the habit they have of jerking their tails, in the same way as the pewee, though they do not do it nearly so often as that bird does. In October, they return in large numbers, dwelling now in the open fields and woods indifferently. They are the last of their tribe to leave us in the fall.

The Yellow-crowned Warbler (*D. coronata*) arrives about the time that the preceding species is leaving us, from the fifteenth to the twentieth of April. This is one of the most abundant and familiar of the class. It has a very sweet song, or warble, which it utters at short intervals in the early morning; its habits are too well known to require any farther notice.

Another bird of this family, differing in name as well as in general appearance from its associates, is the Black and White Creeper (*Mniotilta varia*), which, although a creeper by name, is a true warbler. It arrives about the twentieth of April, and although most of them pass farther north to breed, many spend the summer with us. Its breeding habits are well known; and, from various causes, it is one of the most favorite of the cow-blackbird's adopted nurses. I once found a nest of this bird with eight eggs in it, *five* of which were those of the cow-bird, and the other three her own.

There was much dispute among ornithologists some time ago as to whether the cow-bird ever laid more than one egg in the same nest. It was finally admitted that there were sometimes two placed in the same nest, but that one of these usually proved abortive; the five eggs that I found, however, were all sound, and had, apparently, been hatching for some days. Professor Baird, of the Smithsonian Institution, informed me, that, in company with Dr. Brewer, he found *three* eggs in a nest of the creeper, and that they considered it a very extraordinary circumstance. This bird is so well known, that it is scarcely necessary to speak of its notes, of which it possesses quite a variety. Its most frequent note, in spring, is a very fine, almost shrill song; but besides this, it sometimes, though rarely, gives utterance to a soft, liquid warble, quite like that of the redstart.

It is, perhaps, superfluous to speak of the Yellow Warbler (*D. æstiva*). This, as is well known, is the commonest and most familiar of all its family; and, spending the spring and summer with us, all its habits have long been known. I cannot but think, however, that sufficient justice has not been done to its song. Some authors even seem to be ignorant of the fact that it has a song at all, only giving it credit for its rather harsh, but characteristic spring note. It has, however, a true *sylvicoline* warble, which is sufficiently pleasant in itself, but derives additional interest from its being heard late in summer, long after all other birds, except the vireos, have ceased to sing. During the latter part of July, and all through August, the yellow warbler may be heard singing in the early morning, or in the twilight; and his sweet, liquid notes, pleasing as they always were, but which were scarcely noticed at all in May and June, in the concert of finer and louder voices, now sound doubly sweet amid the silence that reigns among the feathered choir.

The Black-throated Blue Warbler (*D. Canadensis*) arrives about the first week in May, and takes up his quarters in the low and swampy woodlands, where he finds his insect prey

abundant. The females arrive some time after their mates, and stay later; indeed, this seems to be the case with all the warblers. They stay during the whole month, remaining longer than almost any other species. On their first appearance they have no note but a simple chirp, but just before they leave us, the males have a singular drawling song of four or five notes. They pass here again in the fall on their southern migration about the first of October, and are both at this time and in the spring quite abundant.

The Black-throated Green Warbler (*D. virens*). This species, rarer than the former, though still not at all scarce, arrives about the same time. It far excels the former species in its song, which is varied, sweet, and not inferior to that of any of the *Sylvicoleæ*. In autumn, they come down to us from the north along with the black-throated blue warblers, or else a little earlier, and, after remaining a short time, move off to the south.

The Chestnut-sided Warbler (*D. Pennsylvanica*) is one of the most beautiful members of its class. It was, if we may trust the accounts given to us by Audubon and Wilson, a rare species fifty years ago; now, however, it is one of our commonest warblers. In some seasons it is excessively abundant, at others not as much so; but it is never very scarce. Its stay with us in the spring is usually very short, the main body not remaining more than two or three days. While on its spring visit it has, occasionally, a very pleasant song, which it utters at short intervals, in the early morning.

Somewhat resembling the chestnut-sided warbler in its coloring, but very different in its habits, is the Bay-breasted Warbler (*D. castanea*). It is one of the last to arrive, and, owing to the fact that by that time the foliage is pretty dense, and that it makes but a short stay, it is not very often seen. It is not quite so active as the other warblers, and keeps more on the lower boughs, seldom ascending to the tops of the trees. Early in the fall, about the middle of

September, it returns, and, associated with the black-polled warblers in large companies, haunts the groves and woods, being now more familiar than in the spring, and far more abundant. The young are totally different in their colors from the adults, and so closely resemble the young of the black-polled warbler, that it is often very difficult to distinguish them apart. I have never heard their spring love-notes; in fall, they have a faint chirp.

The Connecticut Warbler (*Oporornis agilis*) is one of the scarcest of the family. There are some peculiarities about the habits of this bird that deserve attention. Although excessively rare in spring, perhaps more so than any other species, it is, in autumn, quite often seen, at least in this locality. It has never been my fortune to meet with one in spring, though I have seen many in the fall; judging from analogy, it must pass through the Middle States along with the mourning warbler toward the latter part of May, or beginning of June. It returns late in September, and remains but a short time. Of its habits and notes I know nothing, except that in autumn it frequents low, bushy swamps, such as the Maryland yellow-throat chooses for his home, and utters, at times, a feeble chirp. Why it should be so exceedingly rare in spring, while in the fall it is comparatively common, I can scarcely even conjecture; perhaps it may choose a different route for its northern migration from what it pursues on its southern. The same circumstance may be noticed in the migrations of many other species, though in a much less marked degree.

The Blue-winged Yellow Warbler (*Helminthophaga pinus*) is one of that subdivision of the warbler family called the "Worm-eaters," or, in scientific language, *Vermivoreæ*. The members of this division are distinguished from the typical warblers by sharper and more pointed bills, by plainer colors, and, as a rule, by comparatively harsh and unmusical voices. Their habits partake more of the vireo character than the others; in fact, they bear nearly the same

relation to the *Vireonidæ*, that the *Myiodioctæ*, of which the green black-capped warbler is a member, do to the *Muscicapidæ*, or Flycatchers. The blue-winged yellow warbler is one of those that spend the summer with us; but though it is quite abundant during that season, I have never been fortūnate enough to discover its nest, although I have repeatedly seen the young just fledged. It arrives about the tenth of May, and takes up its abode in the closest thickets and underbrush. Its note is very forcible and characteristic; once heard, it will always be remembered. It is a rapid chirrup, nearly undescribable in words, though the following syllables bear some resemblance to it, *chūăchich-k'-a-re-r'r'r'r'r'*, uttered very quickly. It leaves in August.

The Mourning Warbler (*Geothlypis Philadelphia*) is a very rare species, scarcely less so than the Connecticut warbler. It arrives late in spring, about the twenty-fifth of May, or first of June; of its notes and habits I know nothing, having only seen one or two individuals. This and the Connecticut warbler have been considered by some ornithologists to be identical, but they are undoubtedly perfectly distinct.

One of the rarest of all is the Cape May Warbler (*D. tigrina*). Like the preceding, it is a late comer, arriving generally toward the end of May, and staying a very brief period. In the autumn it passes here, on its southward course, about the twentieth of September. Of its notes I know nothing, except that it has a faint chirp like all the other warblers; and of its habits, nothing worthy of particular notice, except that it shows a preference to cedar, and other evergreen trees.

The Green Black-capped Warbler (*Myiodioctes pusillus*) is one of those belonging to the section or genus intermediate between the warblers and flycatchers. It is very much nearer the former, however, than the latter; and it is a matter of some little surprise, how it could have been ranked as a flycatcher. Audubon says that it passes through the Middle

States very quickly on its way northward; but I have seen it from the nineteenth to the thirtieth of May, though never in abundance. It keeps low down in the trees, and is fond of haunting thickets and open brush-fields. Its ordinary note is a sharp chirp, but occasionally it may be heard to utter a loud, rapid, chattering song, which it repeats at short intervals. It is distinguished by its activity, even among a class of birds preëminent for that quality.

The Canada Warbler (*Myiodioctes Canadensis*) belongs to the same genus as the preceding, and like it was once classed as a flycatcher. It arrives about the middle of May along with the greater mass of warblers, and remains till the first of June. It is very unsuspicious, and more familiar in its habits than most of the warblers. With me, during some seasons, it is exceedingly abundant; at others it is scarcer, though never rare. It affects the lower branches principally, and is always very active. Its song is one of the most agreeable which we hear, though unfortunately it is seldom heard in this part of the country.

The Blue Warbler (*D. cærulea*), is a very rare species; that is to say, in the New England and Northern-middle States, its natural home being the south and the south-west, where it is extremely abundant. It very rarely reaches the New England States, though in the southern parts of Pennsylvania and New Jersey it sometimes occurs in considerable numbers. In a "Catalogue of birds observed in New York, Long and Staten Islands, and the adjacent parts of New Jersey," by Geo. N. Lawrence, no mention of it is made, although the list is very full and complete, embracing many species not before known to occur in those localities. I have only once seen it, and that was on the ninth of May, when I saw a single individual. In general appearance it resembled the female black-throated blue warbler, for which, indeed, I at first mistook it. It had no note of any kind.

The Maryland Yellow-throat (*Geothlypis trichas*) belongs to the *Geothlypeæ*, or Ground Warblers, so named because

they show a marked preference for the ground, seldom ascending to the tops of the trees as the others do, but being always found in the low thickets and bushes, or even on the ground. The present species is, perhaps, the best known, and most familiar of all its tribe; indeed it could not have otherwise obtained its familiar name of "Yellow-throat." It is scarcely necessary to add anything concerning it; suffice it to say, that it holds a most important position in the woodland choir; there is scarcely another bird that we should miss more. Without it, the thickets and coppices would seem almost uninhabited; and its song, simple though it is, would be sadly missed in August, when the hot summer sun has silenced the wood-thrush and the veery.

The Nashville Warbler (*Helminthophaga ruficapilla*) is, in this vicinity, quite an abundant species. It arrives about the twentieth of May, and, after staying a very short period, proceeds northward. During its stay it is shy and retiring, frequenting the tops of forest trees; occasionally it may be seen in orchards, and in the trees lining the brooks and swamps. It returns about the last week in September, remains a few days, and then moves off to the south. It has quite a fine song, which resembles that of the yellow warbler more nearly than any other. Many of the warblers have songs, so closely resembling each other, that it is impossible to describe them accurately in words, though they can at once be distinguished in the woods by the practised ornithologist.

The Blue Yellow-backed Warbler (*Parula Americana*) is one of the smallest, as well as one of the most beautiful of all. Usually very abundant, it is sometimes rather scarce, and its migrations seem to be somewhat irregular. It arrives in the second week in May, and remains a considerable time with us. About the time the apple and pear trees are in bloom, it is most abundant; and any one visiting orchards then, is sure to see it flitting among the blossoms like a winged gem, the dark blue and gold of the bird contrasting

beautifully with the pure white, or delicate pink, of the flowers. In autumn, it is one of the first, if not *the* first, to leave its northern abode and pass through the Middle States, appearing in my locality about the second or third week of September. After haunting, for a few weeks, the white-birch swamps, it moves southward, just as the black-throated blue warbler is arriving. The song of the blue yellow-back is a little sharp and lisping, yet quite varied, and very pleasant to be heard.

The Worm-eating Warbler (*Helmitherus vermivorus*) is one of the very few warblers that are plainly attired, yet even it can make some pretensions to personal beauty; for it has four bands of jet-black on its head, and a dainty suit of light buff on its back. It is not at all common, arrives in the middle of May, and has at that time a rapid, chattering note. It always keeps near the ground, is fond of rustling among the dead leaves of a broken bough, and, besides its chattering song, has, in June, a series of odd notes much like those of the white-breasted nuthatch, but more varied and musical, though hardly entitled to be called a song. It remains with us during the summer, and although I have seen it during the breeding season evidently collecting food for its young, I have never been able to find its nest.

The Hooded Warbler (*Myiodioctes mitratus*), is seldom seen as far north as the neighborhood of New York; in New England it is very rare. I have only observed two or three individuals; these were in low bushes, and seemed particularly active and restless. They are said to have a lively sort of warble, though I have never heard their notes.

Of the Prairie Warbler (*D. discolor*) I know but little. It is said to be abundant in many parts of New Jersey and Long Island, and to breed in those sections. It arrives in the neighborhood of New York in the first week in May, and remains till the autumn, frequenting, in spring, the orchards and gardens, and, in summer, the open, deserted fields and pastures. It has quite a variety of notes, some of which are very pleasing.

The Black-polled Warbler (*D. striata*), is the last of the tribe to arrive in spring, seldom appearing before the twentieth of May. It is a familiar species, being found, while with us, in gardens, orchards, and in the vicinity of houses, as well as in the woods. It is extremely active, and, when seen, is always darting in and out among the branches, so rapidly as almost to pain the eye in endeavoring to follow it. In the fall it returns very early, along with the blue yellow-backed warbler, in the middle of September, from which time until the end of the first week in October, it is very abundant. The young are then so much more numerous than the adults, that one sees twenty in the immature plumage, to one in the mature. As before stated, the young of this bird very closely resemble those of the bay-breasted warbler; so closely, in fact, that naturalists are puzzled to decide which of the two is the autumnal warbler of Wilson and Nuttall, the descriptions applying nearly as well to the one as to the other. It is probable, however, that Wilson did not distinguish between them, or else considered them merely as varieties of the same species. His detailed description of *Sylvia autumnalis* will certainly apply more nearly to the bay-breast; but when he comes to speak of its habits, his remarks apply to the *D. striata*, rather than to the *D. castanea*. All the ornithologists who wrote of the autumnal warbler, mention it as exceedingly abundant in the fall. The black-poll is then very common, as well as in the spring, while the bay-breast is never so. Audubon, and some other authors, find the *S. autumnalis* in the young of the Hemlock Warbler (*Sylvicola parus*); but their view must be incorrect, if the *S. parus* is, as Professor Baird asserts, merely the young of the Blackburnian warbler. During spring, the black-poll has a faint lisping song, of four or five syllables; in the fall, only a faint chirp.

The Blackburnian Warbler (*D. Blackburniæ*) is one of the most beautiful of all the warblers, for none can show more pleasing colors than the orange of its throat and breast.

It is a scarce species, arriving in the second or third week in May, and remaining till the first of June. In its habits it is shy and retiring, hiding itself in the thickest foliage. It sometimes utters an agreeable song. According to Giraud, it has been found breeding near Williamstown, Mass.

Another warbler, vying in beauty with the last, is the Black and Yellow Warbler (*D. maculosa*); and, to add to its attractiveness, its song is no less pleasing to the ear than its colors to the eye. About the middle of May it arrives, sometimes in great abundance, and again in very small numbers, in some seasons being scarcely seen at all; in fall, it is not as common as in spring. Its notes are very soft and musical; like the vireos, it sings while engaged in actively searching for food. It often darts after its prey, in the manner of the redstart, spreading its tail at the same time, as if to exhibit its beauty. In its motions, it is very quick, scarcely less so than the black-poll; in its choice of abode, it seems to have no particular preference, haunting alike the woods, orchards, roadsides, and gardens.

The Redstart (*Setophaga ruticilla*) is the only representative we have of the *Setophageæ*, a subdivision of the warbler family, noted for the extreme brilliancy of their plumage. There are several species in Mexico and the adjacent portions of the United States, but only one ever enters the Northern or Middle States. The redstart is so named, it is supposed, from the color of its tail (German *roth*, red; and *stert*, tail), and no more appropriate name could have been found to distinguish it, at least in the case of our bird; for of all its characteristics, that which at once strikes the beholder, on first seeing it, is its broad red tail. In the woods, it can easily be recognized, however far off, or however momentary the glimpse one catches of it, by the peculiar motion of the tail, which it flirts about from side to side, opening and shutting it occasionally like a fan. Although Wilson states that the redstart remains all the summer in Pennsylvania, and

that it breeds there in abundance, it is seldom seen in this locality after the end of June, although from the beginning of May until that time it is exceedingly common. About the first of September it reappears, and in a short time becomes abundant, remaining so for a few weeks, when it disappears again. It has a number of notes, some of which are very agreeable, especially its spring warble, which has been well described by Nuttall. Its peculiar habits are too well known to require any farther comment.

These species are about all that are to be found in the New England States. There are a few, however, not enumerated above, that occasionally visit them, stragglers from their more proper places of abode. Of these, those that are most likely to occur are the Kentucky Warbler (*Oporornis formosus*), which has been discovered on Long Island several times; the Golden-winged Warbler (*Helminthophaga chrysoptera*), which undoubtedly migrates as far north as Massachusetts; and the Tennessee Warbler (*Helminthophaga peregrina*), which has been shot in the neighborhood of New York City. The Orange-crowned Warbler (*Helminthophaga celata*), is also said to have been found in New York State; and, of course, may occur in the adjacent parts of New England. Its occurrence is very doubtful, however, and is still a subject of dispute.

It would scarcely be proper, in an account of the warbler family, to overlook the Water-thrushes (*Seiurus*), which are now generally classed among the *Sylvicoleæ*, or typical warblers, although their proper place in our systems has long been a matter of discussion. Audubon placed them among his *Motacillinæ*, or wagtails; while Wilson regarded them as true thrushes. Wilson, however, is not to be relied upon in matters relating to classification; he excelled as a descriptive naturalist, but not as a systematist. The specific rank of the water-thrushes, or wagtails, now seems to be universally acknowledged; and there can be little doubt, but that the position assigned to them by Professor Baird, is the correct

one. The reason why they were misunderstood so long, seems to have been their large size and plain colors, combined with a certain thrush-like appearance; they are, however, in their habits and notes, true warblers; more truly so, in fact, than the *Vermivoreæ*, or the *Geothlypeæ*.

Our commonest species is the Golden-crowned Thrush (*Seiurus aurocapillus*). It appears in the New England States in the first week of May, and, taking up its abode in the thickest woods, soon becomes abundant there. It runs along the ground with a graceful, wavering gait, wagging its tail all the while as if to preserve its balance, which seems every moment about to be overthrown. It often mounts to the boughs, from which it sends forth a loud, rattling chant, which can be heard at a considerable distance. At times, in the dusk of the evening or the early morning, it utters a finer song, clear and rapid as the canary's, ending almost always, however, in the usual chatter. While singing, it keeps high up among the trees, usually balancing itself on its wings like a skylark, descending just as it finishes its song. The only author in whom I find mention of this song is Nuttall, who has the credit of being one of our most observing naturalists. Late in summer, it has a sharp, clucking note, something like that of the water-thrush. Its curious nest has long been known; from it, it derives its name of "Oven-bird."

The Water-thrush (*Seiurus Noveboracensis*) arrives two or three weeks after the golden-crown; and, like most of the warblers, remains but a short time with us in the spring, passing on to the north to breed after a brief stay of eight or ten days. A singular circumstance in this bird's history is the fact of its never singing while here in spring; but during its visit on its return, it may often be heard. With all other birds, it is exactly the reverse. It haunts the same localities as the golden-crown, but shows more preference to the margins of small streams and ponds, along which it is seen running with the peculiar motion of

a sand-piper, for which, at a distance, it may easily be mistaken. Its ordinary note is a loud, sharp "cluck;" but in August, when it returns, it has a beautiful song, loud, clear, and sweet, rivalling that of the wood-thrush for beauty. It is quite abundant.

There is a closely allied form of the water-thrush, which is probably entitled to specific rank; the Large-billed Water-thrush (*Seiurus Ludovicianus*). Audubon first discovered it, and at the time considered it as distinct from the ordinary bird, but afterwards held it merely as a variety. The two birds certainly present greater difference than other nearly allied species of warblers that are acknowledged to be distinct, as the Connecticut and mourning warblers; and there is little doubt but that they are really different species. I have seldom seen the large-billed water-thrush, and am inclined to think that it is much rarer than the common wagtail, in this part of the country at least. In its habits and general appearance it seems to be the same as the *aurocapillus*, which may partly account for the fact that it is rarely noticed. I have never heard its notes; they are said to be eminently beautiful, almost equalling those of the nightingale.

NOTES ON TROPICAL FRUITS.

BY WILLIAM T. BRIGHAM.

It may be that one day we shall know the different varieties of oranges, of coffee, of sugar-cane, as we know the pears and apples of our own orchards; but at present we know only that some kinds are better than others. Travellers often describe in glowing terms the tropical fruits, but most of us know the banana (the apple of the tropics) by one typical form. The pleasant season for travelling in the tropics is not the season of fruits, so that many are not noticed by the

tourist; and again, most tropical fruits do not commend themselves to the taste on first acquaintance. If by offering a few random notes of a traveller who considers fruit and vegetables the staple of life, especially in the tropics, contributions from other sources may be provoked, some pleasing sketches of the many delicious products of the warmer regions of the globe may result.

Colocasia antiquorum, var. *esculenta*,—Kalo or Taro. The kalo of the Pacific Islanders is one of the few tropical productions that require great labor and constant care to bring it to perfection. In its wild state, like most of the Araceæ, the kalo has a small corm, or bulb, surmounted by a few arrow-shaped leaves with fleshy stems. It looks much like the Calla of our conservatories. The corm is acrid, and blisters incautious lips. What can have first suggested its use as food? To cultivate it, ponds are prepared by carefully digging the soil and working it with the feet to the depth of some eighteen inches. The ponds are surrounded by a low wall or dyke, and usually cover from a few square yards to half an acre. Water is supplied by an aqueduct.

The upper part of the corm, with the half-developed leaves, is cut off and planted in the mud, usually in rows about a foot apart, and water turned on enough to cover the soil about an inch. Weeds and kalo then commence a race, and it requires the constant care of the owner to keep the former down until the kalo leaves cover the ground. As the kalo leaves unfold, and the bulb grows, more water is let into the pond, and it is sometimes a foot deep. At the end of thirteen months the bulb has attained full size, and the yellow fragrant blossom appears. It is not necessary to gather it at once, and the usual way is to pull it as needed, replanting the stems, so that a constant succession is kept up. One acre will furnish food for six men.

When fully grown, the bulb is six inches or even a foot in diameter, and the bright leaves have closely covered the surface of the pond. The bulb is still as acrid as when in

the wild state, except a rare variety which may be eaten raw, and must be baked to render it eatable. This process is usually performed in earth-ovens, and the roasted vegetable is pounded with great labor into a paste with water. It is at first tough and elastic, but at last the persistent attacks of the stone-pounder reduce it to a paste not unlike mashed potato. This constitutes the pae-ai of the Hawaiians, and may be kept for a long time packed in leaves of the cordyline. When mixed with water in different proportions, it forms "one-fingered poi," or "two-fingered poi," or even "three-fingered poi," accordingly as a mouthful may be taken up on one, two, or three fingers. It is preferred slightly sour, and to a stranger much resembles in smell and appearance sour bookbinder's paste. A fastidious man objects to the way in which a group of natives, seated around a calabash of poi, which an old woman has just stirred up with her hand, dip their fingers in the paste and empty them in their mouths; but if he wishes a good meal he had better get over such prejudices. Babies a few weeks old are passionately fond of poi, and foreigners, who have long lived in poi countries, often send for it half round the world.

The bulb may also be cooked and eaten as a potato, when it is very palatable, or as a farther process the boiled kalo may be cut in slices and fried, or mashed into paste like poi and made into cakes while yet fresh, a food as dear to those used to it as johnny-cake to a Scotchman. Even the stems are boiled as greens, and the tender leaves form a fine dish called luau.

Although kalo is usually grown in ponds or brooks, a very good variety grows well on upland rich soil, and many prefer it to the more common kind. The Hawaiians distinguish more than fifty varieties of this plant, and the paste made from them varies in color, from a bluish-gray to a rich pink-color. Poi requires a little salt-fish as a relish. Kalo grows in New Zealand, Australia, China, where it is carefully cultivated, India, and elsewhere; but the Polynesians, especially

the Hawaiians, alone make poi, other people using the bulb like yams or potatoes. It is said that the corm of the common Jack-in-the-pulpit of New England woods may be treated as kalo, even to the eating.

Pandanus verus, Vaquois, Screw-pine, Lauhala. The pandanus, with its aerial roots and terminal tufts of long graceful leaves, is known by many pictures, but few have eaten the fruit. This much resembles a pine in shape and size, and is hard and useless until fully ripe, when the pulp surrounding the nuts is mashed into a paste and eaten. Many of the atolls in the Pacific produce no other food except the omnipresent cocoa-nut. The taste is rather insipid, and the odor disagreeable. The flower is fleshy and fragrant, and the native doctors in India use it as a sort of love-potion. It is certainly an emetic to some constitutions. The aerial roots have their ends protected by a loose cap or thimble of cellular integument, which is at once absorbed where the root touches the ground. From the peculiar disposition of the leaves they shed water only from the tips and down the stem, forming a complete shelter from the rain, and supplying water where most needed. — *To be continued.*

THE GOLDSMITH BEETLE, AND ITS HABITS.

BY REV. SAMUEL LOCKWOOD.

Among the Beetles of North America, very few can bear away the palm for beauty from the *Cotalpa lanigera*, or, as popularly known, the Goldsmith Beetle. This insect holds no ignoble place in the Coleoptera, being a member of the family Rutilidæ, or the golden-gleaming ones. Indeed, Madam Cotalpa has long been an acknowledged belle among the Rutilians, themselves a distinguished family in Beetledom. No artist can vie with the gorgeous effect pro-

duced by the metallic tints of the Cotalpa's dress. Who has not seen the maiden sporting in a silken attire of but one color, which with every motion in the light became suddenly lustrous with beautiful hues. Almost a monochrome, yet the garb of the Goldsmith beetle presents a rich diversity of tints, chiefly of the yellow sorts. The wing-cases are a gleaming lemon, thus making the whole back appear as if encased by two large plates of paly gold, while the thorax and head are each covered with brilliant red gold, which in the light gives off an almost flaming hue. "The legs are brownish yellow, or brassy, shaded with green." The under part of the insect is a sheet of highly polished copper, from which stands forth a thick coat of "whitish wool," justifying its specific name *lanigera*, wool-bearer. It is pleasant to see how from such a seeming paucity of color, Nature has begotten in this insect such a richness of results. Although with a softer toning down, we see a not dissimilar success in that fine large Bombyx, the pale-green, satin-robed Moon-moth (*Attacus luna*), "preëminent above all our moths in queenly beauty."

In the month of May for many years, in the ordinary culture of my garden at Keyport, N. J., the spade has turned up the *Cotalpa lanigera* (Fig. 1, larva; Fig. 2, imago),

Fig. 1.

Fig. 2.

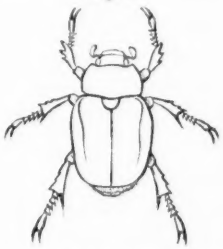


Fig. 3.

and generally in company with the May-beetle, or Dor-bug (*Lachnosterna fusca*, Fig. 3, pupa). The beetle is figured in the NATURALIST, Vol. I, p. 222. Each season has furnished me many more Dors than Goldsmiths. And so far

as my observations tend, the former are individually more mischievous.

To me the question of origin was interesting. Where did the Goldsmiths come from? It is a tree-beetle, and the spade turns them up in the ground. Do they originate in the trees or in the ground? Or is the latter the place for their winter sleep, and for the purpose of undergoing their transformations? On this point, I found the authorities all simply quoting Harris, who says, "the larvæ of this insect are not known; probably they live in the ground upon the roots of plants." My mind was made up to watch. If Newton could say in effect that to the astronomer patience is genius, the burden of the naturalist's "Life Psalm" is: "Learn to labor, and to wait."

For five years was kept up that vernal watching, every May yielding specimens, but no secrets. In the spring of 1865, to my surprise I turned up a fine, fresh, pale imago out of a small heap of dirt that I had put there the previous autumn. This gave a new impulse to investigation. For, that the imago was not there when I made the mound, I was positive; nor could it have entered there during the winter. Hence it was beyond doubt that I had unwittingly carried the larva there myself; or, as I think more probable, the advanced pupa. That month a very strict watch was kept for all specimens that might be turned up by spade or plough, with the hope that a pupa, or a newly, but not quite developed imago, would be obtained. All was in vain. The next step was to examine very thoroughly every larva of a coleopterous kind found in proximity with the imagos. This led to the discovery that certain large whitish grubs about one inch and three quarters long, and over half an inch thick, had a yellowish brown scale on the part corresponding to the thorax, and it was thought it might ripen into the red golden hue of the thorax of the perfected insect. This decided my course. Like Scholasticus, who, having heard that the crow lived a hundred years, at once went to

market, bought a young one, and resolved that he would see; I filled a deep glass jar with earth, and placed six large grubs on the top. It was interesting to observe how quickly these soft creatures burrowed out of sight. They seemed in distress and haste to get out of the light and heat.

Five months after,—it was late in October,—I removed a portion of the earth in the jar. Judge of my delight and astonishment to find a beautiful and perfect Goldsmith beetle in the earthen chamber, which had contained it in its pupa state. I now searched the jar carefully, and found two more seemingly perfect ones, and another ill-formed one. So my conjectures were right. Those white grubs were, indeed, the larvæ of the *Cotalpa lanigera*. Without farther disturbance, except to replace the earth, the jar was set away in the cellar for the winter.

Next May it was again examined. During the month two very pretty ones came to the surface of their own accord. I was delighted to find it was a pair, male and female. Farther examination showed that of the six larvæ, five became imagos, and one died in the pupa state. They were all Goldsmiths. Being particularly anxious about the pair, from which I had hoped to learn something respecting the time and mode of oviposition, extra attention was paid them, and young leaves of the different deciduous trees were supplied; but in vain. They lived but a few days, and died without furnishing one fact.

Now comes a curious question. These insects had lived in the perfect form from October until May, a little more than seven months, that is, the larger fraction of a year. Is this their habit? Do they thus spend, after the last metamorphosis, so much time in a subterranean life? Probably there are two reasons why I have never found the Goldsmith in the fall; the little need of working the ground then, and the probability that the spade or plough does not go deep enough; as in May, the insect is slowly travelling to the surface, and is met by the implement.

When collecting the larvæ in May, I often observed in the same places grubs of the Cotalpa of at least four distinct ages, each representing a year in the life of the insect, judging from Renny's figures of the larvæ of the English Cockchafer, or Dor-beetle (*Melolontha vulgaris*). But the English chafer becomes an imago in January or February, and comes forth into active life in May, just four years from the deposit of the egg. Supposing our Cotalpa to take on the imago form in autumn, and to spend its life from that time to the next May in the ground, it would be five years old when it makes its debut as an arboreal insect.

The books tell us that the larvæ of the Coleoptera always lie on their side. Why? Watching the movements of the Goldsmith in its chamber, I noticed that the cell, or cave, was made large enough to admit of considerable freedom of motion. Lying on its side, and in a curved posture, the larva secures for itself comfort, and the largest movement as respects allotted space; also by the curved motions thus made, the enlarging and keeping up the walls of its earth-chamber. The dog, in setting itself for repose, shows the old instinct,—first the whole body is put in a curve, next a circular motion is made, then it sinks upon its bed. This is the wolf making its bed. And this posture of repose most effectually defends the abdominal, the weaker parts of the body. It is so with the grub. Resting on its side, it in fact rests upon the ends of the hard dorsal segments, by the extension and contraction of which the cycloidal motion is attained, without any friction to the tender abdomen, while the friction of the back keeps the walls of the earth-chamber compact and smooth.

I laid a large larva on my study-table. It instantly turned on its round, smooth back, nicely balanced itself, and with feet upward, moved quite rapidly. One might call the movement serpentine. In fact, the motion was acquired by the separating and bringing together again of the hard segments, very much as the ventral bands or scales of the

snake are moved by the ribs; the tenderness of the abdomen and feet accounting for this singular upside-down way of getting along. It certainly was an effectual getting over the difficulties of a new situation. But this experiment, tried with a younger larva, turned out otherwise. It travelled on its abdomen, and would not, even when so placed, go at all upon its back. It seemed to me that the dorsal segments were too soft to afford it the advantages thus had by the older individual.

I think the Goldsmith prefers land under present tillage, and that the dor-bug loves grassy land better than garden soils; hence the latter is to be regarded as the more injurious of the two. The Goldsmith beetle is very short-lived. It is likely that the female lays her eggs in the ground in June, which month usually sees her for the last time. Their life I hardly think is given to much mischief. Says Harris, "pear trees are particularly subject to their attacks." A more recent observer, Mr. Uhler, indicates that its injury is not serious to this tree, and that it is more frequently found on other trees. It appears to me to be far from particular in its taste; for besides the trees mentioned by Dr. Harris, "the pear, hickory, poplar, and oak," I have found it on the Abele, or white poplar of Europe, the Bilsted, or sweet gum, and seen it eating the Lawton blackberry. For the double purpose of concealment from enemies and comfort of shade, it will draw together a couple of leaves, holding them by the sharp tiny hooks or grapnels on its feet. Of sluggish habits and but low instincts, it quietly nestles in its improvised arbor all the long summer day. At morn and evening twilight it ventures abroad, seeking its food, flying and buzzing about, enjoying its arboreal life, short at best, and to many very short indeed, as they fall an easy prey to the ever-watchful birds. Sometimes their little round of existence is abruptly broken in a very unsentimental way. The little Cotalpa, brimful of life, unintentionally enters the open window, and, dashing bewilderingly in a sort

of involuntary blind-man's buff, strikes its tiny golden visor against the blinding lamp. Ah, thy doom is sealed! A feminine scream. Then the nervous mistress, napkin in hand, courageously attacks, and with the scissors triumphantly captures, and most satisfactorily destroys "the pesky thing!"

NOTE. — Fig. 3 represents the pupa of *Lachnosterna fusca*, the June bug, which was turned up by the spade in a garden in Maine, about the middle of May. The pupa of Cotalpa must closely resemble that of the June bug. It will be seen in our review of the Cosmos, that the cockchaffer lives three years instead of five as stated by early authors. — (EDS.)

THE OSPREY, OR FISH-HAWK.

BY AUGUSTUS FOWLER.

THIS well-known migratory hawk (*Pandion Carolinensis*) arrives on our coast about the last of April, and departs for the south in the month of October. It subsists entirely upon fish, which it procures by its own industry, laboring from morning till evening twilight. Upon examining this bird it will be seen by its peculiar organization how well it is adapted for its vocation. The body is compact and strong, wings long, pointed, and extremely powerful; the femur and tibia muscular; the soles of the feet supplied with hard scaly protuberances, which, with its long, sharp, round claws, prevent its prey from slipping from its grasp when once fairly struck. In the Osprey the wings denote great power; they are acute and long, and, as the wing is the lever of the power, the more distant its extremity is from the centre of motion the more power it has in resisting the air. The stiff, elastic quill-feathers arising from the wing of the osprey, called the primaries, are sixteen inches in length including the quills; the quills are three and a half inches long, and seven-eighths

of an inch in circumference; the feathers, arising from the spurious wing that lie close on the quills of the primaries are also very stiff and give them great support, each primary feather measuring seven-eighths of an inch in width from the greater wing coverts to near its extremity, with the lamina strongly connected by the fibrils of each; those on the upper edge of the shaft are stiff and curve downward, a wise provision in its construction without which the resistance of the air against the wing would be lost by a counteracting resistance in its ascent. In its downward beat on the air the flat surface of the feather only presents itself, in its upward stroke its edges are presented, and the air passes through them. Thus the curvature, length, and power of the wings of the Fish-hawk are designed to be of great service under peculiar circumstances. Rising high in the air and wheeling in his flight, he discovers his finny prey far below him in the water. He poises himself for a moment, then swiftly descends upon his victim. The fish feeling the piercing claws of the hawk, leaps forward through the water, and, having his head lifted up by the power of the hawk, swims to the surface and is easily borne into the air; these are the more favorable circumstances for the hawk.

There are instances when in striking the fish the hawk fastens to him less favorably, and does not so easily succeed in procuring his prize. When the hawk has seized his prey so far behind as to give the fish an opportunity of descending deeper in the water, he is sometimes drawn under its surface, especially if the fish is large. When this occurs the struggle is desperate, for the contest is, which will now remain in his element. It is to the advantage of the hawk, being placed in such hazardous circumstances, that his wings are differently constructed from those of other hawks. Those long, stiff, elastic quill-feathers arising from the hands of the wings of the hawk which curve to such a degree as to be used over his body while partly submerged in the water, give him the victory. After the osprey has secured his prey he rises from

the water and shakes himself, then immediately starts for the woods or some stand to feed upon his spoils. Having reached the tree upon which he intends to light, he circles around two or three times before he rests upon it; so cautious is he lest the Bald-eagle (*Haliaetus leucocephalus*), which so often robs him of his food, may approach him unseen, he remains looking about him for some minutes before commencing to eat; no danger being apprehended, he then strips off a piece of the fish and swallows it. After every mouthful he takes a survey.

A number of years ago a pair of fish-hawks built their nest in Ipswich, Mass. They were so often shot at, and the nest robbed of their eggs, that they abandoned the spot. Their nest is composed chiefly of sticks and seaweed; it is large for the size of the bird, measuring three feet in diameter and two feet in height; the cavity for the reception of eggs is shallow, as is usually in nests of all birds of prey. The attachment between the male and female is strong: the former not only assists in incubation, but also supplies the female with food while performing the arduous task; after having brought her a fish he will rise above the nest in a spiral flight to a great height, then descending on half-closed wings with great force until near the nest, he sweeps around uttering a piercing scream. The female acknowledges the honor thus paid her by rising in the nest and partly extending her wings. The fish-hawk usually lays three eggs, sometimes four; their ground color is white tinged with red; the larger end is sometimes almost entirely covered with blotches of dark umber brown, and spots of the same color are thickly scattered on the smaller end; they vary in size, usually they are two and a half inches in length by one and seven-eighths inches in diameter. At the earliest dawn of day the labors of this fish-hunter commences. He seems to know no danger in the oftentimes perilous undertaking of fastening to a too powerful fish. He crosses our bays, enters the rivers and creeks, still pursuing the chase in wet or dry weather, appar-

ently for the pleasure and excitement it gives, rather than to procure for himself food. This insurmountable passion he gratifies without the least fear of plunging from the great height to which he soars, whizzing through the air swifter than the torrent into which he rushes, making the water foam around him. Night often overtakes him in the heat of the pursuit, and not until the last ray of light has disappeared in the west does he forsake the chase. His day's hunt over, he perches upon some tree bordering upon the shore of the river or coast of the sea, and remains through the night. He is awakened by the freshness of the morning air and the roar of the long rolling waves when their irresistible columns meet the shore and are broken. He rises and shakes the dews of night from his feathers, gives them a few touches with his bill, and again goes forth, rejoicing in his strength, over waters filled with a superabundance of food.

THE PARASITES OF THE HONEY-BEE.

BY A. S. PACKARD, JR.

VERY few bee-keepers are probably aware how many insect parasites infest the Honey-bee. In our own literature we hear almost nothing of this subject, but in Europe much has been written on bee parasites. From Dr. Edward Assmuss' little work on "the Parasites of the Honey-bee," we glean many of the facts now presented, and which cannot fail to interest the general reader as well as the owner of bees.

The study of the habits of animal parasites has of late gained much attention among naturalists, and both the honey and wild bees afford good examples of the singular relation between the host and the parasites which live upon it. Among insects generally, there are certain species which

devour the contents of the egg of the victim. Others, and this is the most common mode of parasitism, attack the insect in its larva state; others in the pupa state, and still others in the perfect, or imago state. Dr. Leidy has shown that of the wood-devouring species, a beetle, *Passalus cornutus*, and some *Myriapods*, or "thousand legs," are, in some cases, tenanted by myriads of microscopic plants and worms which luxuriate in the alimentary canal, while the "caterpillar-fungus" attacks sickly caterpillars, filling out their bodies, and sending out shoots into the air, so that the insect looks as if transformed into a vegetable.

The Ichneumon flies, of which there are undoubtedly several thousand species in this country, are the most common insect parasites. Their habits are noticed in the NATURALIST, Vol. I, p. 81. Next to these are the different species of *Tachina* and its allied genera. These, like Ichneumons, live in the bodies of their hosts, consuming the fatty parts, and finishing their transformations just as the exhausted host is ready to die, issue from their bodies as flies, closely resembling the common house-fly.

An insect, allied to the Tachina, has been found in Europe to be the most formidable foe of the hive-bee, sometimes producing the well-known disease called "foul-brood," which is analogous to the typhus fever of man.

This fly, belonging to the genus *Phora* (Plate 4, fig. 1, *Phora incrassata*; Fig. 2, larva; Fig. 3, *puparium*), is a small insect about one line and a half long, and found in Europe during the summer and autumn flying slowly about flowers and windows, and in the vicinity of bee-hives. Its white, transparent larva is cylindrical, a little pointed before, but broader behind. The head is small and rounded, with short three-jointed antennæ, and at the posterior end of the body are several slender spines. The *puparium*, or pupa-case, inclosing the delicate chrysalis, is oval, consisting of eight segments, flattened above and with two large spines near the head, and four on the extremity of the body.

When impelled by instinct to provide for the continuance of its species, the Phora enters the bee-hive and gains admission to a cell, when it bores with its ovipositor through the skin of the bee-larva, laying its long oval egg in a horizontal position just under the skin. The embryo of the Phora is already well developed, so that in three hours after the egg is inserted in the body of its unsuspecting and helpless host, the embryo is nearly ready to hatch. In about two hours more it actually breaks off the larger end of the egg-shell and at once begins to eat the fatty tissues of its victim, its posterior half still remaining in the shell. In an hour more, it leaves the egg entirely and buries itself completely in the fatty portion of the young bee.

The maggot moults three times. In twelve hours after the last moult it turns around with its head towards the posterior end of the body of its host, and in another twelve hours, having become full-fed, it bores through the skin of the young, eats its way through the brood-covering of the cell and falls to the bottom of the hive, when it changes to a pupa in the dust and dirt, or else it creeps out of the door and transforms in the earth. Twelve days after, the fly appears.

The young bee, emaciated and enfeebled by the attacks of its ravenous parasite, dies, and its decaying body fills the bottom of the cell with a slimy foul-smelling mass, called "foul-brood." This gives rise to a miasma which poisons the neighboring brood, until the contagion (for the disease is analogous to typhus, jail, or ship-fever) spreads through the whole hive, unless promptly checked by removing the cause and thoroughly cleansing the hive.

Foul-brood sometimes attacks our American hives, and, though the cause may not be known, yet from the hints given above we hope to have the history of our species of Phora cleared up, should our disease be found to be sometimes due to the attacks of such a parasite fly.

We figure the Bee-louse of Europe (Plate 4, fig. 4, *Braula*

cæca Nitsch), which is a singular wingless spider-like fly, allied to the wingless Sheep-tick (*Melophagus*), the wingless Bat-tick (*Nycteribia*), and the winged Horse-fly (*Hippobosca*). The body is divided into two regions, like the spider. The head is very large, without eyes or ocelli (simple eyes), and the ovate hind-body consists of five segments, and is covered with stiff hairs. It is one-half to two-thirds of a line long. This spider-fly is "pupiparous," that is, the young, of which only a very few are produced, is not born until it has, or is just about to, assume the pupa state. The larva (Plate 4, Fig. 5) is oval, eleven-jointed, and white in color. The very day it is hatched it sheds its skin and changes to an oval puparium of a dark-brown color.

Its habits resemble that of the flea. Indeed, should we compress its body strongly, it would bear a striking resemblance to that insect. It is evidently a connecting link between the flea, and the two-winged flies. Like the former it lives and brings forth its young on the body of its host, and draws its food from its host by plunging its stout beak into the skin of the bee.

It has not been noticed in this country, but is liable to be imported on the bodies of Italian bees. Generally, one or two of the Braulas may, on close examination, be detected on the body of the bee; sometimes the poor bees are loaded down by as many as a hundred of these hungry bloodsuckers. Assmuss recommends rubbing them off with a feather, as the bee goes in and out of the door of its hive.

Among the beetles are a few forms occasionally found in bees' nests and also parasitic on the body of the bee. *Trichodes apiarius* Linn. (Plate 4, fig. 6, fig. 6 *a*, larva; fig. 6 *b*, pupa, front view) has long been known in Europe to attack the young bees. In its perfect, or beetle, state it is found on flowers, like our *Trichodes Nuttallii*, which is commonly found on the Spiræa in August, and which may yet prove to enter our bee-hives. The larva devours the brood, but with the modern hive its ravages may be readily detected.

The Oil-beetle, *Meloë angusticollis* Say (Plate 4, fig. 7, male, differing from the female by having the antennæ as if twisted into a knot; Fig. 8, the active larva found on the body of the bee), is a large dark-blue insect found crawling in the grass in the vicinity of the nests of Andrena and Halictus and other wild bees in May, and again in August and September. The eggs are laid in a mass covered with earth at the root of some plant. During April and early in May, when the willows are in blossom, we have found the young recently hatched larvæ in considerable abundance creeping briskly over the bees, or with their heads plunged between the segments of the body, greedily sucking in the juices of their host. Those that we saw occurred on the humble-bee, Halictus and Andrena, and various flies (Syrphus and Muscidæ), and there is no reason why they should not infest the honey-bee which frequent similar flowers, as they actually are known to do in Europe. These larvæ are probably hatched out near where the bees hybernate so as to creep into their bodies before they fly in the spring, as it would be impossible for them to crawl up a willow tree ten feet high or more, their feet being solely adapted for climbing over the hairy body of the bee, which they do not leave until about to undergo their strange and unusual transformations.

In Europe, Assmuss states that on being brought into the nest by the bee, they leave the bee and devour the eggs in the bee-cells, and then attack the bee-bread. When full-fed and ready to pass through their transformations to attain the bee state, instead of at once assuming the pupa and imago state, as in the Trichodes represented above, they pass through a *hyper-metamorphosis*, as Fabre, a French naturalist, calls it. In other words, the changes in form which are preparatory to assuming the pupa and imago states are here more marked and almost coequal with the larva and pupa states, so that the Meloë, instead of passing through three states (the egg, larva, and pupa), in reality passes through

these and two others in addition, which are intermediate. The whole subject of the metamorphosis of this beetle needs revision, but Fabre states that the larva, soon after entering the nest of its host, changes its skin and assumes a second larva form (Plate 4, fig. 9), which somewhat resembles the larva of the Goldsmith beetle (P. 187, fig. 2). Newport, who with Siebold has carefully described the metamorphoses of Meloë, does not mention this stage in its development, which he calls "pseudo-chrysalis." It is motionless; the head is mask-like, without movable appendages, and the feet are represented by six tubercles. This is more properly speaking the semi-pupa, and the mature pupa grows beneath its mask-like form, which is finally moulted. This form, however, according to Fabre, changes its skin and turns into a third larva-form (Plate 4, fig. 10, from Newport). After some time it assumes its true pupa form (Plate 4, fig. 11, from Newport), and finally moults this skin to appear as a beetle (Plate 4, fig. 7).

Fabre has also, in a lively and well-written account, given a history of *Sitaris*, an European beetle, somewhat resembling Meloë. He states that Sitaris lays its eggs near the entrance of bees' nests, and at the very moment that the bee lays her egg in the honey-cell the flattened ovate Sitaris larva drops from the body of the bee upon which it has been living, and feasts upon the contents of the freshly laid egg. After eating this delicate morsel it devours the honey in the cell of the bee and changes into a white cylindrical, nearly footless grub, and after it is full-fed, and has assumed a supposed "pupa" state, the skin, without bursting, incloses a kind of hard "pupa" skin, which is very similar in outline to the former larva, within whose skin is found a whitish larva which directly changes into the true pupa. In a succeeding state this pupa in the ordinary way changes to a beetle which belongs to the same group of Coleoptera as Meloë. We cannot but think, from observations made on the humble-bee, the wasp, two species of moths, and several other insects,

that this "hyper-metamorphosis" is the normal mode of insect metamorphosis, and that the changes of these insects, made beneath the skin of the mature larva before assuming the pupa state, are almost as remarkable, though less easily observed, as those of Meloë and Sitaris. Several other beetles allied to Meloë are known to be parasitic on wild bees, though the accounts of them are fragmentary.

The history of *Stylops*, a beetle allied to Meloë, is no less strange than that of Meloë, and is in some respects still more interesting. On June 18th I captured an *Andrena vicina* (figured on p. 397 of the first volume of the NATURALIST) which had been "stylopized". On looking at my capture I saw a pale reddish-brown triangular mark on the bee's abdomen; this was the flattened head and thorax of a female Stylops (Plate 4, fig. 12, position of the female of Stylops, seen in profile in the abdomen of the bee; Fig. 13, the female seen from above. The head and thorax is soldered into a single flattened mass, the baggy hind-body being greatly enlarged like that of the gravid female of the white ant, *Termes*, and consisting of nine segments).

On carefully drawing out the whole body which is very extensible, soft, and baggy, and examining it under a high power of the microscope, we saw multitudes, at least several hundred, of very minute larvæ (Plate 5, fig. 6, as seen from above, and showing the alimentary canal ending in a blind sac; Fig. 6 *a*, side view), like particles of dust to the naked eye, issuing in every direction from the body of the parent now torn open in places, though most of them made their exit through an opening on the under side of the head-thorax. The Stylops, being hatched out while still in the body of the parent, is therefore viviparous. She probably never lays eggs.

On the last of April, when the Mezereon was in blossom, I caught the singular-looking male, *Stylops Childreni* Gray (Plate 4, fig. 14; *a*, side view; it is about one-fourth of an inch long), which was as unlike its partner as possible. I

laid it under a tumbler, when the delicate insect flew and tumbled about till it died of exhaustion in a few hours.

It appears, then, that the larvæ are hatched during the middle or last of June from eggs fertilized in April. The larvæ then crawl out on to the body of the bee, on which they are transported to the nest, when they enter, according to Peck's observations, the body of the larva, on whose fatty parts they feed. Previous to changing to a pupa, the larva lives with its head turned towards that of its host, but before assuming the perfect state (which they do in the late summer or autumn) they must reverse their position. The female protrudes the front part of its body between the segments of the abdomen of her host, as represented in our figure. This change, Newport thinks, takes place after the bee-host has undergone its metamorphoses, though the bee does not leave her earthen cells until the following spring. While the male Stylops deserts its host, his wingless partner is imprisoned during her whole life within her host, and dies immediately after giving birth to her myriad (for Newport thinks she produces over 2000 young) offspring.

Xenos Peckii, an allied insect, was discovered by Dr. Peck to be parasitic in the body of wasps, and there are now known to be several species of this small but curious family, *Stylopidæ*, which are known to live parasitically on the bodies of our wild bees and wasps. The presence of these parasites which live on the fatty parts finally exhausts the host, so that the sterile female bee dies prematurely.

As in the higher animals bees are afflicted with parasitic worms which induce disease and sometimes death. The well-known hair-worm, Gordius, is an insect-parasite. The adult form is about the size of a thick horse-hair, and is seen in moist soil and in pools. It lays, according to Dr. Leidy, "millions of eggs connected together in long cords." The microscopic tadpole-shaped young penetrate into the bodies of insects frequenting damp localities. Fairly esconced within the body of their unsuspecting host, they luxuriate on its fatty tis-

sues, and pass through their metamorphoses into the adult form, when they desert their living house and take to the water to lay their eggs. In Europe, Siebold has described *Gordius subbifurcus* which infests the drones of the honey-bee, and also other insects. Professor Siebold has also described *Mermis albicans*, which is a similar kind of hair-worm, from two to five inches long, and whitish in color. This worm is also found, strangely enough, only in the drones, though it is the workers which frequent watery places to appease their thirst.

Thousands of insects are carried off yearly by parasitic fungi. The ravages of the Muscardine, caused by a minute fungus (*Botrytris Bassiana* Balsamo), has threatened the extinction of silk culture in Europe. Dr. Leidy mentions a fungus which must annually carry off myriads of the Seventeen Year Locust. A somewhat similar fungus, *Mucor mellitophorus* (Plate 4, fig. 15), infests bees, filling the stomach with microscopic colorless spores, so as to greatly weaken the insect.

As there is a probability that many insects, parasitic on the wild bees, may sooner or later afflict the honey-bee, and also to farther illustrate the complex nature of insect parasitism, we will for a moment look at some other bee-parasites.

Among the numerous insects preying in some way upon the Humble-bee are to be found other species of bees and moths, flies and beetles. Insect parasites often imitate their host: *Apathus* (Plate 5, fig. 1, *A. Ashtoni*) can scarcely be distinguished from its host, and yet it lives cuckoo-like in the cells of the humble-bee, though we know not yet how injurious it really is. Then there is the *Conops* and *Volucella*, the former of which lives like Tachina and Phora within the bee's body, while the latter devours the brood. The young (Plate 5, figs. 5, 5*a*) of another fly allied to Anthomyia, of which the Onion-fly is an example, is also not infrequently met with. A small beetle (Plate 5, fig. 4, *Antherophagus*

ochraceus) is a common inmate of humble-bees' nests, and probably feeds upon the wax and pollen. We have also found several larvæ (Plate 4, fig. 16) of a beetle of which we do not know the adult form. Of similar habits is probably a small moth (*Nephopteryx Edmandsii*, Plate 5, figs. 2, 2*a*, larva; fig. 2*b*, chrysalis, or pupa) which undoubtedly feeds upon the waxen walls of the bee-cells, and thus, like the attacks of the common bee-moth (*Galleria cereana*), whose habits are so well known as not to detain us, must prove very prejudicial to the well-being of the colony. This moth is in turn infested by an Ichneumon-fly (*Microgaster nephoptericis*, Plate 5, figs. 3, 3*a*) which must destroy many of them.

The figures of the early stages of a minute ichneumon represented on the same plate (Fig. 7, larva, and 7*a*, pupa, of *Anthophorabia megachilis*) which is parasitic on Megachile, the Leaf-cutter bee, illustrates the transformations of the Ichneumon-flies, the smallest species of which yet known (and we believe the smallest insect known at all) is the *Pteratomus Putnami*, or "winged-atom," which is only one-ninetieth of an inch in length, and is parasitic on Anthophorabia, itself a parasite. A species of mite (Plate 5, figs. 9, 9*a*, the same seen from beneath) is always to be found in humble-bees' nests, but it is not thought to be specially obnoxious to the bees themselves, though several species of mites (*Gamasus*, etc.) are known to be parasitic on insects.

For a proper study of our bees and wasps, we should collect their nests from the last of May until late in the autumn. We should watch for the different broods and collect the larva, pupa, and adult of both sexes, as well as the workers. The cells containing the young, with whatever parasites may be found on them, may be placed in alcohol, while the mature bees may be pinned. The simplest method of collecting the nests of humble-bees is to visit them before sunrise or after sunset, when the bees are in the nest, and we can secure the whole colony. The bees can be picked up with

Fig. 1.

Fig. 3. Fig. 2.

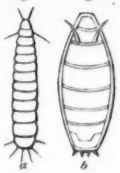


Fig. 5.

Fig. 4.

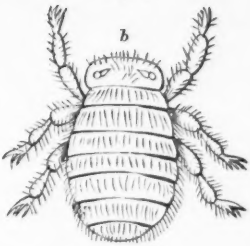


Fig. 9.

Fig. 8.

Fig. 11.

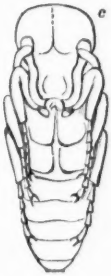


Fig. 7.

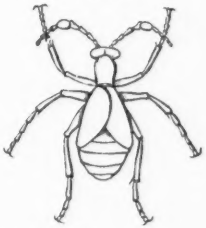
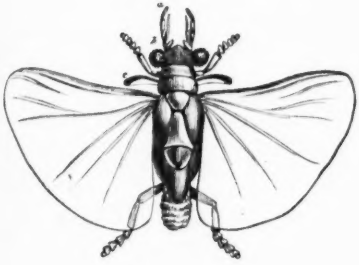


Fig. 10.

Fig. 6.

Fig. 14.



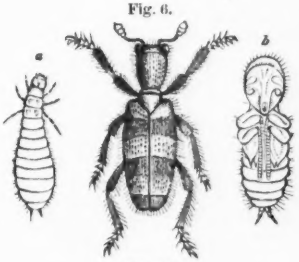


Fig. 14 *a*.

Fig. 15.

Fig. 12.

Fig. 16.

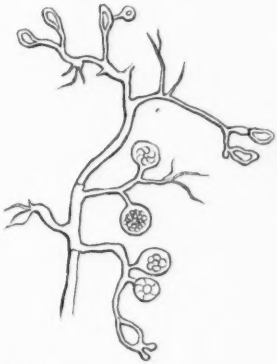
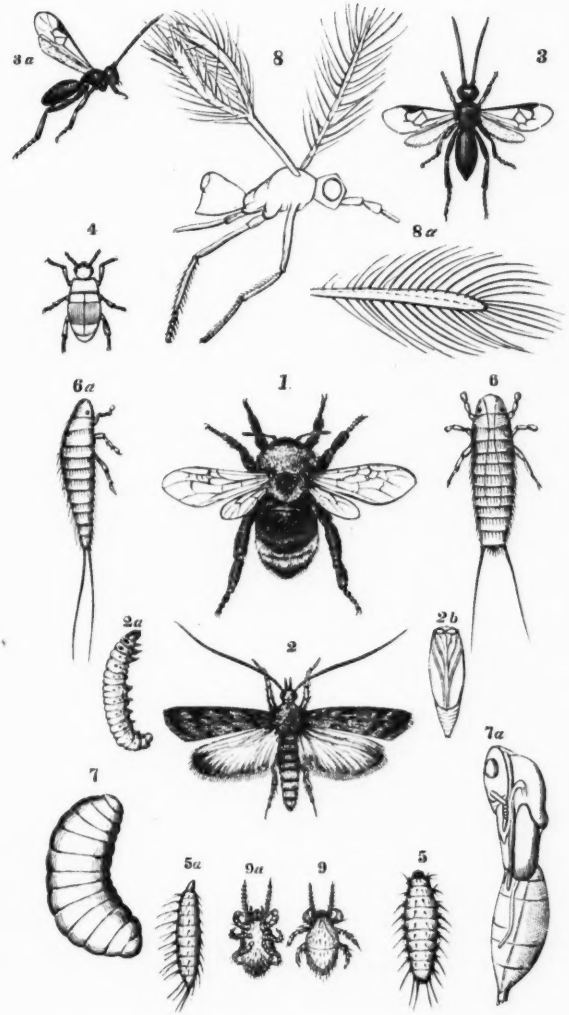


Fig. 13.

PACKARD ON THE PARASITES OF THE HONEY-BEE.

— THE —
JOHN CREERAR
LIBRARY



PACKARD ON THE PARASITES OF THE HONEY-BEE.

THE
JOHN CRERAR
LIBRARY

forceps as they emerge from the nest, or caught with the net and then pinned. Refractory colonies may be easily quelled by pouring in ether or chloroform, or burning sulphur at the aperture, as is the best method of procedure with wasp's nests.

The solitary species, besides boring in the earth like Andrena and Halictus, whose habits have been described in the first volume of the NATURALIST, also bore in the stems of different plants, such as the elder, syringa, raspberry, and blackberry. Nearly fifty species of insects, mostly hymenoptera, are known in France to burrow in the stems of the blackberry alone! Now is the time to look for their burrows in the dead branches. Their presence is usually detected by an old hole at the end of a broken branch. The writer would be greatly obliged for material to aid him in the study of our bees and wasps, and would take pleasure in corresponding with those interested in the study of their habits, and would be very grateful for specimens of the young in alcohol, their parasites and nests.

REVIEWS.

VOLCANIC ROCKS.*—The author of this interesting memoir classifies volcanic rocks in five orders. The first order consists of Rhyolite with three families, Nevadite or granitic-rhyolite, Liparite or porphyritic-rhyolite, and Rhyolite proper or Lithodic and Hyaline-rhyolite. The second is Trachyte with two families, Samidin-trachyte and Oligoclase-trachyte. The third is Propylite with three families, Quartzose-propylite, Hornblendic-propylite, and Augitic-propylite. The fourth is Andesite with two families, Hornblendic-andesite, and Augitic-andesite. The fifth order is Basalt with three families, Dolerite, Basalt, and Leucitophyte.

The author confines himself in this classification to volcanic rocks of Tertiary and Post-tertiary age, which he subdivides into "massive eruptions" and "volcanic eruptions." The origin of massive eruptions is

* Principles of the Natural System of Volcanic Rocks. By F. Baron Richthofen, Dr. Phil. Memoirs presented to the California Academy of Science, Vol. I, Part 2. May 6, 1867. pp. 4, 94.

attributed to a time when the crust of the earth was thinner than at present, and opened in wide cracks, letting out vast masses of rock in a state of aqueous fusion. These are supposed to have choked up the cracks, and in the gradual consolidation which followed, only local lakes of matter were left in a state of fusion, which find their outlets in the existing volcanoes.

Both in massive and volcanic eruptions the Propylitic rocks are the first or earliest ejected, then in successive, though not invariable, sequence, the Andesitic, Trachytic, Rhyolitic, and Basaltic lavas. Active volcanoes are divided into two classes, those which still continue to eject the same material as exists at their bases in the ancient "massive eruptions," from which the author supposes they take their rise, and those grander rents which have undergone periodical changes in the nature of the ejected rocks.

Lassen's Peak in Northern California belongs to the latter class. The base is Andersitic tufa and ashes, in stratified layers nearly four thousand feet thick, and upon this currents of Andesitic lava, then trachytic lava streams succeed in elongated, sloping tables; rhyolite composes the present summit to the depth of fifteen hundred feet; and, lastly, locally separated, are inferior rents to the north which have thrown out basalt of apparently very recent origin.

Thus the periodical changes, taking place in such larger active volcanoes, correspond in the order of their succession with those exhibited by the older and more massive eruptions.

Active volcanoes may, therefore, be classified as belonging to the propylitic, andesitic, trachytic, rhyolitic, or basaltic epochs, or as arising in one of these and passing through several successive stages of development.

Thus Lassen's Peak has reproduced, during its successive changes, the structural features of existing Andesitic, trachytic, rhyolitic, and basaltic volcanoes, and also the order of succession which is observed in the massive eruptions of former periods. The author, however, candidly admits, that, in some instances, the order of succession is partially reversed, as in the island of St. Paul in the Indian Ocean, where the rhyolitic rocks are overlaid by basalt, and this again by rhyolitic and basaltic rocks in succession.

Following upon this is an highly interesting discussion of the chemical composition, correlations of age and texture, correlations of age and composition, the geographical distribution, and the origin of volcanic rocks.

The extrusion of the lava is accounted for by the expansion which was consequent upon the changes of the denser rocks around the lower part of the cracks or orifices, from a solid or highly viscous state, to one of aqueous fusion.

Granite and Syenite are regarded as the product of very ancient massive eruptions, and as of wholly volcanic origin.

Though these views are so entirely novel, and even startling, and opposed in respect to the origin of granite to the results obtained by the Canadian Survey among the vast masses of granite in Canada West, it is nevertheless a philosophical essay which commands our respect from its solidity, and the evident familiarity and experience of the author with his subject. Whether the principles laid down are true or not in the general application for them claimed, this essay has unquestionably opened a new path to geological investigations.

The Volcanoes of the Hawaiian Islands.*—This work is filled with numerous observations, many of great value, made by the author during his travels among these islands. The whole group is treated one by one in detail.

From Mr. Coan, and others resident among the Sandwich Islands, the author gathered many interesting facts with regard to the various eruptions of the volcanoes of Hawaii, and the physical geography of other members of the group.

The maps of the Kauai and main groups are original, and the crater of Kilauea, on the scale of one-half mile to the inch, is from an actual survey by Mr. Brigham, and of great value to future explorers.

One fact of general interest is, that while the Hawaiian lines of volcanoes run east and west, the major axis of their oval craters are invariably north and south, and, by comparison with the craters of eighteen other lines of volcanoes, it is found that they are generally at right angles with the axes of elevation of the different mountain chains to which they belong.

Mr. Brigham adheres to the mechanical theory of the origin of volcanoes,—"the earth's crust contracts unequally owing to its various composition, structure, and form, causing certain portions to fall below the general level, opening rents at the boundaries, and forcing up molten matter to the surface.

The Geology of Iowa.†—This survey, conducted by Dr. C. A. White, and his assistant, Mr. O. H. St. John, has extended over the counties to the south-west of the Des Moines River, and resulted in the discovery of two series of the Carboniferous rocks. The upper series of beds lie to the south-west of this river, attaining a maximum thickness of one hundred and seventy-five feet. A coal-bed, twenty inches in thickness, was traced along the valley of the Nodaways through the counties of Adams, Taylor, and Page. The upper series, comprising nearly all the workable coal-beds in the State, is found to the north-east of the Des Moines River. The inclination of the strata is south-west, and therefore Dr. White argues that miners in the south-western counties may expect to find pro-

* Notes on the Volcanoes of the Hawaiian Islands, with a History of their various Eruptions. By W. T. Brigham, A. M. Memoirs of the Boston Society of Natural History. Vol. I, Part 3, pp. 132, with five plates.

† First and Second Annual Report of Progress. By the State Geologist and the Assistant and Chemist on the Geological Survey of the State of Iowa. 8vo, 284 pp. Des Moines, 1868.

ductive coal-beds by shafting through the Upper Series, a result which will probably prove of great economical value to the people of this part of the State. A new feature is the publication of popular letters which were originally written for the newspapers by order of the legislature of Iowa while the survey was in progress, a plan which other States might do well to imitate, since it brings directly before the people of each county what the survey is really accomplishing for their benefit. Gypsum was found in such quantities near Fort Dodge that it has been used as a building stone. In Mills county two systems of glacial scratches were found diverging at an angle of thirty-one degrees, and about twenty miles north another system diverging from one of these ninety-three degrees. The first two "approximately coincide with the general courses of the Missouri and Platte Rivers," and the last with "the general direction of the drainage of the western watershed." The "Walled Lakes" of Iowa, a paper also published in the May number of this Magazine, is especially interesting as showing how nature, in some of her processes, may build up a structure so regular that it may be mistaken for an artificial construction. Some space is also given to descriptions of Indian mounds, usually circular in form, but thus far found to be barren of implements or other remains, and occupying the most elevated and picturesque elevations. No conjecture is made in respect to their character or the purposes for which they were intended by their ancient builders.

California Mosses.*—Professor Lesquereux remarks that "The flora of California, in all its departments, is liable to great local varieties, according to the peculiar atmospheric and chemical conditions to which it is subjected. The more the phænogamic flora of that region is studied, the more the number of species is diminished."

The Variation of Animals and Plants under Domestication.†—We have but space at present to quote from Dr. Gray's preface to the American Edition regarding this storehouse of facts, with which every naturalist, as well as agriculturist, should be acquainted.

"It is a perfect treasury of facts relative to domesticated animals and some of the more important cultivated plants; of the principles which govern the production, improvement, and preservation of breeds and races; of the laws of inheritance, upon which all organization of improved varieties depends; of the ill effects of breeding in-and-in, necessary though this be to the full development and perpetuation of a choice race or breed; and of the good effects of an occasional cross, by which, rightly managed, a breed may be invigorated or improved. These and various kindred subjects are discussed scientifically with rare ability, acuteness, and impartiality, by one who has devoted most of his life to

* The California Academy of Science (formerly California Academy of *Natural* Sciences) has begun to publish quarto Memoirs. Vol. I, Part 1, contains a "Catalogue of Pacific Coast Mosses," by Professor Leo Lesquereux. pp. 38.

† The Variation of Animals and Plants under Domestication. By Charles Darwin. Authorized edition, with a Preface by Professor Asa Gray. 2 vols. 12mo, with Illustrations. New York, Orange Judd & Co., 1868. $6.00.

this class of inquiries, and who discusses them in a way and style equally interesting and instructive to the professional naturalist or physiologist, and to the general reader. To the intelligent agriculturist and breeder, these volumes will be especially valuable, and it is in the interest of such practical men and amateurs that they are here reprinted."

Cosmos. (Weekly) Paris.—This journal, besides giving weekly reports of the proceedings of the French Academy, has a most useful summary of news in all departments of physical and natural science, including rural economy and the application of chemistry to the arts. During the past year it has published, in weekly parts, "The Comparative Geology of Meteorites," by M. Stanislas Meunier, son of M. Victor Meunier, the Editor in chief. The leading article of the present number (dated March 21, 1868) is on the general method of the immediate analysis of meteoric stones, by M. Stanislas Meunier, which is succeeded by an account of M. M. E. Fremy and Terreil's general method of the immediate analysis of vegetable tissues.

M. T. Reiset writes on the ravages of the Cockchafer, or "Hanneton" (*Melolontha vulgaris*), and its larva, the beetle of which in the spring of 1865 defoliated the oaks and other trees, while immense numbers of their larvæ in the succeeding year, 1866, devoured to a fearful extent the roots of garden vegetables, etc., at a loss to the department of the Lower Seine of over five millions of dollars. This insect is three years in arriving at its perfect beetle state. The larvæ hatched from eggs laid by the beetles which appeared in such numbers in 1865, passed a second winter, that of 1867, at a mean depth in the soil of $\frac{40}{100}$ of a metre, or nearly a foot and a half. The thermometer placed in the ground (which was covered with snow) at this mean depth, never rose to the zero point* as *minimum*. Thus the larvæ survived, after being perfectly frozen (probably most subterranean larvæ are thus frozen, and thaw out in the spring at the approach of warm weather). In June, 1867, the grubs having become full-fed, made their way upwards to a mean distance of about thirteen inches below the surface, where, in less than two months, they all changed to the pupa state, and in October and November the perfect beetle appeared. The beetles, however, hybernate, remaining below the surface for a period of five or six months, and appearing in April and May. The immature larvæ, warned by the approaching cold, began to migrate deep down in the soil in October, when the temperature of the earth was ten degrees above zero. As soon as the snow melted they gradually rose towards the surface. They began to rise February 23, 1867, when the temperature of the earth had risen a little, being + 7°. 1, the mean temperature of the soil in January being + 2°. 8.

Quarterly Journal of Science. (London.) In the April number Mr. John Mayer writes on the claims of Nitro-glycerine as an industrial agent. It has been used as a blasting material in the operations of mining, quarrying, and railway cutting for about three years. He con-

* By the Centigrade thermometer.

siders it as in reality "less dangerous than gun-cotton, gunpowder, and more completely under control than they are." "Weight for weight the new explosive is ten times more powerful than gunpowder. The extraordinary mechanical or eruptive power which it exerts is partly owing to the fact that there is no solid residue attending the explosion, and that the enormous pressure exerted by the resulting gases is due to the great rapidity of the explosions." In blasting, hard tamping is of little use, owing to its curious property of "striking down," *i. e.* exerting its explosive force almost entirely in a downward direction. — Mr. C. F. Danvers writes an interesting article on Ransom's Patent Concrete Stone. This very durable building material is made by mixing "sand, chalk, or other mineral substance with its proper proportion of a solution of silicate of soda in an ordinary pug-mill, and the mixture, which very much resembles in substance fresh putty rolled in sand, and is of a very plastic consistence, is either pressed into blocks or moulds, or can be rolled into slabs or such forms as may be desired, and is afterwards either saturated with, or immersed in, a solution of chloride of calcium, when a double decomposition of the two solutions employed immediately takes place. The silica combines with the calcium, and at once forms an insoluble silicate of lime, firmly binding together all the particles of which the stone is composed, whilst at the same time the chlorine combines with the soda and forms chloride of sodium, or common salt, which is easily removed."—Prof. G. Zaddach gives a very thorough account of Amber. It is found on the shore of the Baltic, principally at Samland, where there are "in deep-seated deposits an inexhaustible store of this valuable fossil." Amber is the gum or liquid resin of a pine tree of Eocene Tertiary age, and occurs in rolled fragments, very seldom weighing as much as half a pound, in the form of pins, drops, and plates, which were formed between the bark and the wood, or between the yearly rings of growth of the stem, and were washed from the low boggy coast into the sea, in which the crabs, sea-urchins, and oysters, associated with it, lived, the deposits in which they are now found having been formed at the mouth of a stream. With the Amber-pine flourished Camphor trees, Willows, Birches, Beeches, and numerous Oaks; and amongst the Coniferes was a *Thuja*, very similar to the *Thuja occidentalis*, or White Cedar, now living in this country, "next to which abounded *Widdringtonia*, Pines, and Firs in great variety. Many thousands of the first might already have perished, and, while the wood decayed, the resin, with which the stems and branches were stored, might have accumulated in large quantities in bogs and lakes in the soil of the forest. In order to explain, however, that this accumulation of Amber could be suddenly broken up, floated away, and scattered, I assume that the coast of the district was at that time on the point of sinking." Amber is torn up from its bed by storms and thrown upon the shore, "where a hundred hands are waiting to intercept it with nets;" or "the inhabitants of the coast go in boats, and, turning the stones [between which the larger pieces are

found] with hooks fastened on long poles, endeavor to discover the Amber in the interspaces, and to draw it up with small nets." This is called "striking for amber." Like the gum copal of Africa, amber is of interest to the entomologist from the insect remains it contains, some of which are figured in the second plate (from specimens selected by Mr. F. Smith, from the British Museum) accompanying the article, the first plate being a geological map with sections of the localities of Amber. — The gigantic Dragon-tree of Teneriffe is no more. Its age was estimated to be over 6000 years old. — M. Balsamo has obtained hybrids between the American and the Italian Cotton plants. He hopes to obtain a plant of the long staple form of our species (Gossypium Barbadense) which shall ripen earlier in Italy than it now does. He has also investigated the action of light on the germination of seeds. "He found by using a glass jar full of vegetable mould, that seeds exposed to the action of sunlight were greatly retarded in, if not entirely prevented from, germination. Seeds to which only yellow light had access were not affected. — Frau Lüders believes that she has proved (what many fungologists were prepared for), that *Vibriones* are produced from the spores and germinal filaments of various moulds or fungi. Vibriones were supposed to be infusoria. The learned lady believes that the blood of living animals contains *Vibriones*, but during life they are quiescent, showing no signs of life until putrescence commences. Professor Hallier, the best authority on fungi, but who does not accept Frau Lüders' results as to the connection of "moulds" and "vibriones," announces "that he has been able to isolate and identify from the blood of typhus fever patients a distinct form of fungus; also in vaccine matter and in other cases. Dr. Salisbury, of New York, has also recently made known the observation of distinct fungi in the fluids of persons suffering from other contagious diseases. Are we not advancing to a great fact as to the nature of such diseases? Fermentation and vaccination may come to mean much the same thing. Frau Lüders has also successfully shown that "yeast" may be grown from many "moulds," as first demonstrated by Hallier. — Dr. O. Fraas believes that there were formerly glaciers on Mount Sinai. — Dr. Collingwood has discovered on the shore of the China Sea an enormous blue Sea-anemone, two feet in diameter, in which little fishes take shelter. A small fish is known to inhabit the body-cavity of Holothurians, or Sea-cucumber, and also of Jelly-fishes. — Mr. Shirley Hibbard believes the culture of the Ailanthus Silk-worm in Great Britain to be a delusion. The thread is too short. An acre under culture yielded about ten shillings, and another year eight pounds, while the same space planted with potatoes yields twenty pounds; and frosts carry off the insects. The cocoons "are least in value of any silk-worm's cocoon, and are in fact almost rubbish." — Professor Kölliker has lately made the discovery of true polymorphism among coral animals (Anthozoa). Besides the usual form of sea-pens (*Virgularia* and *Pennatula*) is another, destitute of tentacles, besides other important anatomical differences. — The bodies of

various Molluscs are found to contain acids, enabling them to bore in rocks. Pholas is known to bore into gneiss (stratified granite). Two boring worms, *Leucodore* and *Sabella*, which bore cavities in limestone rocks, also contain acid. — Mr. Flower thinks there is but one species of Sperm Whale.

NATURAL HISTORY MISCELLANY.

BOTANY.

The Long Moss of the South (*Tillandsia usneoides*). — In a recent number of the Naturalist Dr. Asa Gray inquires whether this is really an Epiphyte, and gives some reasons for a suspicion it may probably be a parasite. Several times I have had fresh specimens, and fastened them on blocks, — dead blocks of course, — just as we do with Epiphytæ, Orchidæa, and had them grow as healthily as in their natural state. One I left in the Orchidæa house, at Springbrook, near Philadelphia, some years ago, had then been eighteen months on the block, and I believe was amongst the lot sold at public sale two years afterwards. Many Tillandsias, and allied genera, grow nearly as well on blocks in Orchidæa houses, as in the earth. — Thomas Meehan.

In the hope of throwing some light on the question raised by Professor Gray, in the February number of the Naturalist, I offer the following facts, which fall under my daily observation, attempting, however, no explanation.

1. The Long Moss, or Spanish Moss (*Tillandsia usneoides*), grows abundantly and luxuriantly on the dead branches of our live-oaks, and other trees, but when these dead branches fall to the ground, it soon dies.

2. On a tree near my house, which has been entirely dead for more than a year, there is a thrifty growth of this moss.

3. I often find it simply hanging by a loop to a twig, or a projecting point of bark, and still growing vigorously.

4. On fallen trees, even on those recently cut down, I find it generally, but not always, withered and dead. — D. H. Jacques, *Glen Evergreen, Jacksonville, Fla.*

Long or Black Moss (*Tillandsia usneoides*) only an Epiphyte. — Concurrent testimony from several quarters makes it clear that *Tillandsia* does not perish on cutting down the tree that supports it, and that it thrives as well on dead as on living trees. Our original informant must therefore have been mistaken. — A. Gray.

Anomalous Flowers of the Willow. — There is a species of Willow (*Salix*) growing near here which has for two seasons borne the above

anomalous flowers, either a double ovary or two single ones appearing above each scale. Gray, in his Manual (p. 416), mentions a "transformation of anthers into imperfect ovaries" as common in *S. rostrata*, and occasional in other species; but this specimen has not the "yellow scales" nor the "prominently veined" leaves of that species, it is more like *S. humilis;* and besides, if this is such a transformation, and the duality of the organs seems to indicate that it is, it is a *complete* one; no intimation, excepting the duality, existing which may point to the stamens as their origin. The ovaries are full-sized and perfect, and the embryos well developed. I have specimens of the above, and also of Arethusa bulbosa, Woodwardia angustifolia, Lycopodium inundatum, Draba verna, and a few other scarce plants, which I should like to exchange for scarce plants which I have not. I should like also to correspond with two or three young botanists for the purpose of more general exchange. — W. P. Bolles, *Box 356, New London, Conn.*

Comparative Floral Calendar, Cass County, Missouri. —

Peucedanum	in bloom,	.	.	.	.	Mar. 23,	1868.
Isopyrum biternatum	"	Apr. 21,	1864.	Apr. 19,	1867.	Mar. 24,	"
Viola pubescens	"	Apr. 21,	"	Apr. 19,	"	Mar. 28,	"
Erythronium albidum	"	Mar. 29,	"	Apr. 2,	"	Mar. 28,	"
Astragalus caryocarpus	"	Apr. 27,	"	Apr. 28,	"	Mar. 28,	"
Peach	"	Apr. 27,	"	Apr. 20,	"	Mar. 31,	"
Antennaria plantaginifolia . . .	"	Apr. 27,	"	Apr. 19,	"	Apr. 1,	"
Strawberry	"	May 2,	"	Apr. 20,	"	Apr. 2,	"
Viola cuculata	"	Apr. 14,	"	Apr. 19,	"	Apr. 1,	"
Phlox divaricata	"	Apr. 29,	"	May 7,	"	Apr. 2,	"
Claytonia Virginica	"	Apr. 14,	"	Apr. 15,	"	Apr. 2,	"

G. C. Brodhead.

White Wild Columbines, etc. — In the April number of the Naturalist, Mr. Millington mentions a white Columbine. I would state that I, also, have seen white columbines (*Aquilegia Canadensis*). During last summer I saw a very pretty white *Lobelia syphilitica*. I have also seen white flowered plants of the common ironweed (*Vernonia Noveboracensis*). —G. C. Broadhead.

Is the Elder a Native Plant? — In answer to inquiries as to the nativity of the Elder (*Sambucus Canadensis*) I would say most positively, that it is as much a native of the United States as the oak or elm. My father being one of the first settlers of Illinois, the elder was used for making spiles for tapping maple trees, and in the years 1857 and 1858, I explored a considerable part of Northern Kansas, which was then in its wild and primitive state, and the elder was always present in the valleys in connection with the wild plum, choke-cherries, etc. The elder is more plentiful in Kansas than in Illinois, and was before the white man became possessor of the soil. — Wm. J. McLaughlin.

FLOWERING OF THE "GERMAN IVY."—In the March number of the NATURALIST is a communication on "German Ivy," and its "flowering under peculiar circumstances." The description given by Professor Gray is certainly very interesting and remarkable. Allow me to state that if this plant is taken in the spring and placed in the ground without a pot, then transplanted to a pot in the fall and cut down close to the roots shortly after the appearance of new shoots, flower buds, and flowers will follow. I send with this specimens of this plant which has been treated in this way, and so successful has it been, that efforts to *prevent* the plant from *blooming* have been *unavailing*, so *vigorously* does it *flower*. Is there an explanation possible why this plant and others of different species should blossom so profusely after such severe pruning?—JAMES L. LITTLE, JR.

A VARIETY OF THE COMMON AGRIMONY.—A variety of the common agrimony (*Agrimonia Eupatoria*) is occasionally found in this vicinity, having nine leaflets instead of seven, which is the usual number. In all other respects it appears to be identical with the ordinary form, except that it is, perhaps, a little taller, and occurs in rather more swampy localities.—T. MARTIN TRIPPE, *Orange Co., N. Y.*

ZOÖLOGY.

HOW SPIDERS BEGIN THEIR WEBS.—Early in the spring of 1866, while arrangements were making for photographing a live male of the *Nephila plumipes* (the so-called "Silk Spider of South Carolina"), the spider, after having several times traversed the circle of wire on which it was, suddenly stopped, took a firm position at the top of the frame and lifted the abdomen, pointing it toward a large skylight which occupied the middle of the ceiling: a slender, shining thread was seen to shoot forth from the spinnerets which occupy the end of the abdomen; it seemed to have a blunt, rounded extremity, which advanced through the air rather quickly for a few inches, but afterward more slowly and steadily, and with an upward tendency, but always in the direction of the skylight. When it had reached the length of five or six feet, I allowed it to become attached to my coat: the issue ceased at once, and the spider, having attached the end of the line, turned about and began to pull upon it. I now broke it off near the wire, and, believing that there was a current of air toward the skylight, I blew gently upon the spider from various directions, and found that it always pointed her abdomen in the direction in which I blew, and that the thread was emitted in the same direction. So that while it seemed to have the power of projecting a thread for a short distance, yet it always availed itself of the prevailing current of air.

This single instance by no means proves that all spiders do or can employ this method of bridging over spaces, and it may be that on ordi-

nary occasions they do, as every one has seen them, descend to the ground, emitting the thread as they advance, and pulling in the slack before attaching it to the desired point. But the former method enables them to cross water and to pass from tree to tree; while the well-known buoyancy of the silk permits them (or at least the smaller species) to sail along our water, hanging at the lower end of a line whose upper end is invisible.

In reference to this subject, see Kirby and Spence's Entomology, Motions of Insects, and Manner in which they take their Food."—B. G. WILDER.

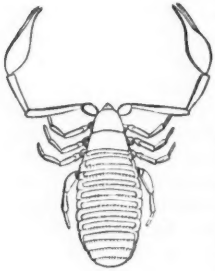
THE WOLVERENE.—The Wolverene follows the Beaver and preys upon them; in northern latitudes, the wolverene is almost always present where the beaver is abundant. The beaver has a beaten path on the bank of the stream near his lodge. There the wolverene lies in wait for him, and often cuts short his career. A half-breed Frenchman here owns a female of the bull-terrier breed, which follows the beaver to his lodge, and pulls him out, having sometimes a severe fight, and showing ugly cuts about the head, from the beaver's sharp teeth. The Indians offer a big price (a large buffalo horse) for the dog.—D. S. S., *Fort Sully, Dakota Territory.*

THE MOCKING BIRD.—I observe that while all the other song-birds are silent in our Southern forests and groves, the Mocking-bird is quite as musical as during the spring and summer. Several of them are singing on the topmost twigs of the oaks near my house most of the day. More than a dozen pairs of them built their nests within sight of the dwelling and out-buildings during the past spring and summer, all of them laying twice, and some three or more times. Few, however, succeeded in rearing their young, many of them being destroyed by snakes, and more by the persistent, but generally unsuccessful, attempts of the ladies of the family to domesticate them. Their first nests were invariably built in low bushes or on fences, but if these were disturbed, either before or after the hatching of the young, the parent birds, as if taught by experience, always built on trees, peach-trees being preferred. They came boldly to the house, and even into the rooms where we were sitting, to feed the young we had taken from them.—D. H. JACQUES.

THE DRAGON FLY.—Three years ago, in the middle of the summer, I was sitting in my tent, in camp, on the old battle-ground below New Orleans, when my attention was attracted by the swift flight of a large Dragon-fly, closely pursued by another of the same size. Twenty-five yards from my tent the fugitive was overtaken, and both fell to the ground together, tumbling over and over. I walked immediately to the place, and observed that in that very short time the creature had bitten his victim entirely in two, in the articulation just forward of the front wings, and had settled complacently to eating the body, commencing at the part he had bitten through. The head, thorax, and legs retained life, struggling and kicking vigorously during several hours I had the

opportunity to observe them. I will remark that the stagnant lagoons of Louisiana, and perhaps the abundant food, develop dragon-flies of a very large size. In view of the pest of musquitoes, it is a pity the great insect-eater is not still more abundant. — D. S. S.

THE FALSE SCORPION. — These little scorpion-like animals are intermediate in structure between the mites and the spiders. We figure *Chelifer cancroides* L. kindly identified by Dr. Hagen, of the Cambridge Museum, who has studied our American species. He states that it seizes the legs of flies, and is thus transported about by them.



"The fact that an animal changes its location by means of another animal is interesting, and it is evident that this way is taken either from laziness, or from incapacity to accomplish his purpose in any other way. In the *Chelifer*, whose movements are slow, this means of locomotion is apparently adopted to find suitable food more easily. Necessarily such a state of things cannot be unique in natural history. I confess that at present I know nothing analogous to it among insects except the case of the larva of *Meloë*, the well known *Triungulinus*, which creeps upon bees on purpose to be taken into their nests. Something analogous exists, I think, among fishes. *Echeneis remora* is often found attached to other fishes by a peculiar apparatus. But the purpose in the *Echeneis* is not very clear, for this species swims very quickly. The apparatus for the attachment of *Cyclopterus lumpus* is quite different; its purpose is not known." — HAGEN.

The False-scorpion is about a quarter of an inch long, and may be observed moving with a curious sideways gait on opening old books, and in dusty places generally. It is said to hunt the flea vigorously, and also to devour the *Atropos*, or little white book-louse. It has also been found lurking under the elytra, or wing-covers of beetles, but it does not seem to be truly parasitic in its habits.

THE JACK-SNIPE. — While gunning one day on Jordan Creek, Lehigh county, Pennsylvania, I saw four little birds running along ahead of me, until they came near some clumps of grass, when they ran under the edges and hid themselves. I also, at the same time, saw one of the parent birds fly away. I caught one of the little fellows and examined him; he was about two or two and a half inches in height, of a light bluish-gray color above, and lighter on the breast; color of bill yellowish pink; eyes brown; legs greenish black.

The female (as it turned out to be) soon came and took up a little bird and carried it about one hundred yards to the mill-race. I should say flew with her load, as it seemed to me rather a great one for the old bird. She soon returned, and took up a second, flying off with it; and so the third and fourth. I then went to see where she had taken her family, and

found them in a nest of thin sticks and soft grasses on the ground, about two or three feet above the water as it made its exit from the mill. The nest was also near the mill, close to the water-wheel, near to where the water shot over the wheel. I shot the female, and I afterwards saw that the male bird was attending them as the female had done. It was the female and young of *Tringa maculata*. — WALTER J. HOFFMAN, *Reading, Pa.*

THE LOCUST KILLER. — I never saw but one of these wasps, and that was about two years ago, and then only for a few moments. It appeared to be marked almost, if not precisely, like a "hornet," and to be about two or two and a half inches in length, and large in proportion; truly a most formidable looking insect. The "killer" had seized one of our August locusts, and was endeavoring to rise from the ground with it, the locust clinging to the grass, and fluttering and screaming all the while. Before I could seize them, they rose from the ground and made off in a bee-line, at a height of about twelve or fifteen feet, the locust resisting with might and main. I am told they make nests in the ground, boring a hole to the depth of two or three feet. They must be rare, or I should have seen them before. — C. W. TAYLOR, *Hulmeville, Pa.*

The wasp is, probably, the *Stizus speciosus*, which seizes the Cicada to store its nest with, which is, probably, not more than a foot in depth. We hope our correspondent will observe its habits more closely, and send us specimens so that it can be identified with certainty. — EDS.

THE PRAIRIE DOG. — Among my observations on the prairie, I have learned that the prairie dog has a very destructive enemy in the Lynx, or American Wild-cat. This quick and fierce animal hides in the grass in the outskirts of the dog-town, and pounces upon any unlucky dog that starts out to forage, and carries him off before he can whisk his funny little tail. — D. S. S.

THE ROBIN AT FAULT. — A remarkable instance of the lack of the "bump of locality" in birds came under my observation some years ago. I had nailed a board of moderate width under the eaves of a barn to form a resting-place for the nests of the Cliff, or Jug-swallow. It was inclined at an angle so as to form a sort of trough. A robin commenced building her nest in it, but seeming unable to fix upon any particular spot, deposited the mud and straw along the entire length of the trough, about ten feet. After working several days, she abandoned her task. Shortly afterwards I saw a robin (whether the same bird or not I cannot say) attempting to build her nest in the same way, along the entire outer cornice of a house, about thirty feet. — A. P. R., *Geneva, N. Y.*

A VARIETY OF THE BLACKBIRD. — I suppose that almost every one is well acquainted with the general appearance of the Red-winged Starling, or Blackbird (*Agelaius Phœniceus* Vieillot). Last May I shot, near Fresh Pond, in this vicinity, one of these birds having a crescent-shaped mark, of a bright orange-color on the breast; this was about equal in size

and form to the half of an old-fashioned copper cent, and the feathers were colored nearly to the roots. In other respects the bird was precisely similar to the ordinary male of this species. — WILLIAM BREWSTER, *Cambridge, Mass.*

THE BELTED KINGFISHER. — I observe a note concerning the nesting of the Belted Kingfisher in your November number, in which Mr. Fowler differs from Mr. Samuels. I now propose to be a connecting link between the two, and to say that I have *always* found the holes of *C. alcyon* "six or eight feet long," as Mr. S. says, and *always* "in the form of an elbow," as Mr. F. describes them; and that I have sometimes found a bed of sticks, grass, etc., and sometimes not. I wish, too, to ask if any one has ever known them to turn to the left, as I have never seen them branch otherwise than to the right. — W. E. ENDICOTT.

THE DWARF THRUSH IN MASSACHUSETTS. — A single specimen of the Dwarf Thrush (*Turdus nanus* Aud.) was obtained in Waltham, Mass., on Oct. 9, 1867. It was taken by Mr. L. L. Thaxter, and its identity was first discovered by Mr. C. J. Maynard, of Newtonville, Mass. The bird was found in high, dry woodland, not in a swampy locality, such as the nearly-allied species frequent.* — E. A. SAMUELS.

GEOLOGY.

THE BONE CAVES OF BRAZIL AND THEIR ANIMAL REMAINS. By Prof. J. Reinhardt. — The distinguished author, well known to zoölogists by his numerous and valuable contributions to the history of mammals (especially Cetacea), Birds, Reptiles, Fishes, etc., has favored one of the popular scientific journals† of his country with a detailed and very interesting account of "The Bone Caves of Brazil and their Animal Remains," — a subject on which Professor Reinhardt, through his repeated travels in that country and his familiarity with its recent and Post-pliocene fauna,‡ must be regarded as one of the first authorities. In the hope that one of the many popular scientific journals of England will procure

*The following description of this bird corresponds essentially with that of Pacific specimens given by Professor Baird: — Upper mandible of bill, black; lower mandible, at the base and for half its length, yellow; at the tip, black, gradually fading into light brown towards the middle; the head above, and the back to the rump brownish-olive, becoming paler on the rump to the upper tail coverts, which are rufous; tail, both above and beneath, with a decided purple tinge, not rufous, as with T. Pallasii; chin, throat, and breast, pale buff, each feather having the tip marked with a large triangular spot of dark brown, which spots are less decided on the breast; sides grayish brown; belly and lower tail-coverts, pure white; on opening the wing, the broad buff band across the whole width within appears, as with T. Pallasii, but is a shade paler; iris brown; feet and tarsi paler brown; tail more rounded than T. Pallasii. Length, 6.70; breadth, 10.56; wing, 3.40; tail, 2.80 inch. The stomach was filled with small insects, principally beetles.

†Journal of Popular Science, Edited by C. Fogh and Dr. C. F. Luetken, Copenhagen, 1867.

‡Dr. P. W. Lund's collections from the Brazilian caves in the Museum of Copenhagen are intrusted to the care of Professor Reinhardt.

its readers the pleasure of becoming acquainted with his memoir *in extenso*, through a translation, we shall here restrain ourselves to giving, in the author's own words, the general conclusions with which he sums up the most important results of his careful studies on the subject.

1. During the Postpliocene epoch Brazil was inhabited by a very rich mammalian fauna, of which the recent one might almost be said to be a mere fraction or a crippled remnant, as many of its genera, even families and suborders, have vanished, and very few been added in more recent times.

2. During the whole postpliocene epoch the Brazilian mammalian fauna had the same peculiar character which now distinguishes the South American fauna, compared with that of the old world; the extinct genera belonging to groups and families, that this very day are peculiarly characteristic of South America. Only two of its genera, the one extinct (mastodon), the other still living (the horse), belong to families that in our epoch are limited to the Eastern hemisphere.

3. All the mammalian orders were not in the same degree richer in genera in former times than now. The Bruta (Sloths, etc.), Pecora (Horse, Sheep, etc.), Proboscidea (Elephants), and lastly the Feræ have relatively suffered the greatest losses. Some orders, for instance the Chiroptera (Bats) and Simiæ (Monkies), perhaps contain even more genera now than formerly.

4. The Postpliocene mammalian fauna of South America differed much more from the modern one, and was especially more rich in peculiar, now extinct, genera, than the corresponding fauna of the old world.

5. The scantiness of great mammalia, one might say the dwarf-like stamp impressed upon the South American mammalian fauna of our day, compared with that of the Eastern hemisphere, was much less distinct, or rather failed altogether in the prehistorical fauna. The Postpliocene Mastodons and Toxodonts of Brazil, its many gigantic Armadillos and Sloths, could well rival the Elephant, Rhinoceros, and Hippopotamus, which, during the same period, roamed over the soil of Europe.—C. F. LÜTKEN, *Copenhagen, Feb.* 14, 1868.

ENTOMOLOGICAL CALENDAR.

IN June we have found that beautiful butterfly *Militæa Phaëton* rising from the low cold swamps. Its larva (Fig. 1) transforms early in June or the last week in May, into a beautiful chrysalis (Fig. 2). The larva hybernates through the winter, and may be found early in spring feeding on the leaves of the Aster, the Viburnum dentatum, and Hazel. It is black and deep orange-red, with long thick-set black spines.

The Currant-borer, *Trochilium tipuliforme*, a beautiful, slender, agile,

deep-blue moth, with transparent wings, flies the last of the month about currant bushes, and its chrysalids may be found in May in the stems. The ravages of the Currant-moth, *Abraxas? ribeāria*, begin soon after the leaves are out. Among moths, that of the American Tent-caterpillar flies during the last of June and July, and its white cocoons can be detected under bark, and in sheltered parts of fences and outhouses.

Fig. 1.

Fig. 2.

Among others of the interesting family of the Silkworms, Bombycidæ, are Lithosia, Crocota, and its allies, which fly in the daytime, and the different species of Arctia, and the white arctians, Spilosoma, and Leucarctia, the parent of the Salt-marsh Caterpillar.

Many Leaf-rollers, *Tortrices*, are rolling up leaves in various ways for their habitations, and to conceal them from too prying birds; and hosts of young Tineans are now mining leaves, and excavating the interior of seeds and various fruits. Grape-growers should guard against the attacks of a species of Tortrix which rolls the leaves of the grape, and of a Tinean, probably a species of *Gelechia*, which, according to Mr. M. C. Reed, of Hudson, Ohio, "in midsummer deposits its eggs in the grape; a single egg in a grape. Its presence is soon indicated by a reddish color on that side of the yet green grape, and on opening it, the winding channel opened by the larva in the pulp is seen, and the minute worm, which is white, with a dark head, is found at the end of the channel. It continues to feed upon the pulp of the fruit, and when it reaches the seeds, eats out their interior; and if the supply from one grape is extinguished before its growth is completed, it fastens this to an adjoining grape with a web, and burrows into it. It finally grows to about one half of an inch in length, becomes brown, almost black, the head retaining its cinnamon color. When it leaves the grape it is very active, and has the power of letting itself down by a thread of silk. All my efforts to obtain the cocoons failed until I placed fresh grape-leaves in the jar containing the imported grapes. The larvæ immediately betook themselves to these, and, cutting a curved line through the leaf thus), sometimes two lines thus ( ), folded the edge or edges over, and in the fold assumed the chrysalis form. From specimens saved, I shall hope to obtain the perfect insect this season, and perhaps obtain information which will aid in checking its increase. Already it is so abundant that it is necessary to examine every branch of ripe grapes, and clip out the infested berries before sending them to the table. A rapid increase in its numbers would interfere seriously with the cultivation of the grape in this locality."

The Rose-beetle, *Macrodactyla subspinosa*, appears in great abundance. The various species of *Buprestis* are abundant; among them are the

Peach-borer, *Diecrca divaricata*, found flying now about peach and cherry trees; *Chrysobothris fulvoguttata*, and *C. Harrisii*, about white pines. The large weevil, *Arrhenodes septentrionalis*, which lives under the bark of the white oak, appears in June and July. The Chinch-bug begins its terrible ravages in the wheat-fields. The various species of *Chrysopa*, or Lace-winged flies, appear during this month.

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

Academy of Natural Sciences. *Philadelphia, Feb.* 6, 1868. (*Conchological Section.*)—A paper was read by Dr. James Lewis on the distribution of shells in some parts of New York. Mr. W. M. Gabb remarked on shell collecting in Lower California. Dr. Beadle spoke on the great abundance of *Helix desertorum* in the deserts of Sinai.

March 5.—Dr. E. I. Nolan spoke of the irridescence of *Latirus prismaticus*. This shell, when immersed in water, exhibits a beautiful irridescent display of colors, purple predominating, on the entire surface. On microscopic examination he had found that the surface was everywhere covered with an exceedingly fine network of lines, and suggested that the expansion of these lines in water might so decrease the spaces between them as to cause the rays of light falling upon the surfaces to be refracted, thus producing the irridescence observed.

Boston Society of Natural History. *November* 6, 1867.—Dr. B. G. Wilder made some remarks upon the want of perfect symmetry in the leaves of elms and hop-hornbeams. Professor Agassiz brought forward the results of an examination of the skulls of the American bison and the European aurochs. By means of specimens exhibited, he pointed out the distinctions he had noticed in the two skulls, and stated that these differences were such as to characterize them clearly as distinct species. Professor Agassiz also exhibited the skull of a species of dolphin new to America, discovered upon the coast of Nantucket. The animal was sixteen feet in length.

Nov. 27.—Mr. S. H. Scudder exhibited a curious specimen of "walking-stick" found in this vicinity. One of the fore-legs had been lost in early life and replaced by a new one less than one quarter the length of the other fore-leg. Mr. Trouvelot states that this replacement of the leg can only take place previous to the third moult; the leg was almost perfectly formed, although one of the tarsal joints was wanting, and the foot was unprovided with claws or the usual foot-pad.

Among a number of interesting specimens, Mr. F. G. Sanborn exhibited a dragon-fly with a singular malformation or arrest of development in one wing,—the outer half being abortive,—and the cast-off skin of a young grasshopper impaled on a needle of pine. Specimens like the last were frequently found on leaves of pine or blades of grass, the leaf passing

through the head and out at the back of the insect. As the head always points towards the base of the leaf, Mr. Sanborn believes that when the insects wish to rid themselves of their exuviæ, they perch themselves upon a blade of grass or needle of pine, and, thrusting their heads against a contiguous leaf, force the skin backward. He exhibited skins of the plant lice, which, although very minute, had been emptied of their contents by internal parasites. After the transformation of the parasite it had gnawed a nearly complete circle through the dry skin, thus partially detaching a nearly rounded lid or cover through which it could make its escape.

Two of the most curious specimens exhibited were acorn cups which had been used by spiders; in one, the opening had been flatly roofed over with a web, leaving only a small aperture for ingress and egress; in the other, the cup was closed by a finer web with no opening whatever; when examined, neither spider, young, nor eggs were discovered within; this was probably an instance of a curious instinct which leads barren spiders to expend much time and labor in preparing for an imaginary progeny.

Dec. 4.—The Secretary read a paper by Mr. A. S. Bickmore, giving some notes of a short tour on the island of Yesso, Japan.

Dec. 18.—Dr. Pickering referred to Mr. Bickmore's paper on the Ainos, read at the last meeting. He said he had been struck by the description of the treatment of the dead among this people, as similar practices prevailed among the North American Indians; this, he thought, pointed to a common descent. To strengthen his argument, he endeavored to show that the *Ginseng*, or panacea of the Chinese, was obtained from a plant which only grew in the valley of the Ohio; in this case, close communication by the way of the Aleutian Isles must have taken place between the two nations.

The Rev. Mr. Perry read a paper upon the red sandstone of Vermont, and its relations to other rocks. Mr. Perry claimed that the red sandstone was the equivalent of the Potsdam sandstone of the New York geologists, and that the adjacent formations to the eastward were not highly metamorphosed rocks of a more recent period, as has been constantly asserted, but were older than the red sandstone, and lay unconformably beneath it.

Professor Agassiz stated that he had recently been reviewing the Siluroid fishes for the sake of illustrating the definitions he had long since presented for the different categories of structure among animals. The Siluroids had always been considered a natural group; placed, at first, in a single genus which was subsequently divided into two, they were next considered a family including several genera, and finally an order, embracing several groups termed families. Was there then no meaning in the terms genus, family, order? Professor Agassiz urged strongly that the application of these terms should be uniform, since a genus really remains a genus no matter how numerous its subdivisions. He believed that *orders* were founded upon degrees of complication of structure, and *families* upon the forms of animals.

Professor Agassiz claimed that the group was an order of Ganoid fishes which should be placed between the sturgeons and garpikes: they had one striking feature in the structure of the jaws, not only reptilian, but bird-like; this was the power of sliding the palatine-bone forward. The brain greatly resembled that of a sturgeon. Four families were mentioned belonging to the order.

Jan. 3. — Mr. George L. Vose read a communication on the flattened and distorted pebbles in the conglomerate near Rangely, Maine. He reviewed the different theories accounting for their form, and exhibited drawings and tracings taken from the stones themselves. He endeavored to show that the changes had occurred when the pebbles were hard, and not necessarily, as urged by Dr. Hitchcock and son, when in a plastic condition. This was best shown by a tracing of one pebble which had been bent over another, and exhibited lines of fracture converging toward the point of resistance, with an abrupt depression of the central portion of the overlying pebble.

Jan. 15. — The Secretary read a paper by Mr. A. M. Edwards, of New York, in which the author attempted to show that the division of the Diatomaceæ into fixed and free genera, was unnatural. He believed that all of these microscopic organisms were free during one portion of their lives, and adherent during another.

Feb. 5. — Dr. T. M. Brewer read a paper on the house-sparrow of Europe, defending it from the charge of destructiveness alluded to in a recent communication by Dr. Pickering. He showed that all the best English ornithologists were either silent on this point or satisfied that the bird did far more good than harm. He read an extract from the report of a commission to the Senate of France, furnishing very strong evidence in favor of the usefulness of the sparrow, and showing that at least one half, and sometimes almost all of its food consisted of destructive insects. The report farther stated that wherever the sparrow had been unwisely banished, injurious insects had immediately increased to such an extent as to become a calamity, destroying crops. In Hungary, Bavaria, and different districts of France, the sparrow had been introduced and stringent laws passed for its protection. One instance was cited where the brood of a single pair had been known to destroy over seven hundred cock-chafers. Dr. Brewer said that the sparrows, recently introduced into New York and the neighboring cities, had cleared the trees of measure-worms so successfully, that, in 1867, the foliage was not known to have been entirely destroyed on a single tree. The birds are already regarded with great favor in New York; commodious, thatched houses have been constructed for them, and, in some of the parks, they are regularly fed.

Great expectations are formed in regard to the services they will render in this country, not only in keeping down the measure-worms, but in destroying canker-worms, caterpillars, and possibly curculios.

NOTE. — We regret that we cannot report more fully the meetings of Scientific Societies. We cannot give the titles of every paper read, or abstracts of all the remarks made, but only those of the most general interest.

DANA NATURAL HISTORY SOCIETY.—We had hoped before this to have found space to notice the good work being done by Mr. A. J. Ebell, who is now lecturing before various educational institutions, and also establishing numerous chapters of the Dana Natural History Society. The Raritan chapter, established at Matawan, N. J., held its first regular meeting at Glenwood Institute, Nov. 4, 1867, when Rev. Samuel Lockwood, a contributor to the NATURALIST, delivered a lecture on the study of Natural History.

The Dana Natural History Society of the North-west College, Evanston, Illinois, have received a number of additions to their Museum begun by selections from Mr. Ebell's cabinet. A lecture was delivered on March 7, in the college chapel, by Mr. Ebell, the proceeds of which are to increase the Museum and Library.

CORRESPONDENCE.

J. W. C., Cheyenne, Dakota.—The snails sent were *Helix Cooperi*, a species peculiar to California and adjacent territory.

C. S. M., Jamaica Plains, Mass.—The name of the shell of which you send a pencil sketch is *Natica heros*. You will find a description of it in Gould's Invertebrata of Massachusetts, p. 231. The work you will find in any public library.

E. H. J., Pawtucket, R. I.—Papers and descriptions of American shells are scattered through the proceedings of the various Scientific Societies. Binney's Terrestrial Mollusca will cost $30 or $35. Gould's Invertebrata of Massachusetts, though published nearly thirty years ago, is the best work on New England Shells. A new edition, with all the species illustrated, will be out in the course of a year. As for fresh-water Aquaria, the experience you will gain by a few patient attempts at stocking one, will be worth more than all the books. Be careful not to have too many animals in one tank.

Anon.,* Pen Yan, N. Y.—"The English Cyclopædia," by Charles Knight. Natural History, in five volumes, 4to, London. Baird's "Cyclopædia of Natural Sciences." "An Expository Lexicon of above 50,000 ancient and Modern Scientific Terms," by R. G. Mayne. London (Churchill), £2 10s. 8vo. "Dictionary of Terms used in Geology, with their Derivations," by D. H. McNicholl, M. D. Small 8vo. 12s. (Reeve & Co.) The two last give the derivations.

BOOKS RECEIVED.

Journal of the Franklin Institute, Philadelphia. January—May, 1868.
The Field. April 12, 19. London.
Cosmos. March 28, April 4, 11. Paris.
Chemical News. May. New York.
Land and Water. March 7–28. London.

* We cannot hereafter notice any anonymous communications.